LALLY COLUMN HANDBOOK

1897 1926

Tenth Edition

LALLY HANDBOOK

OF

LALLY COLUMN CONSTRUCTION

(STEEL COLUMNS — CONCRETE FILLED)

1926

Lally Column Companies

ERIE AND ALBANY STREETS, CAMBRIDGE, MASS.

211–249 Lombardy Street, Brooklyn, New York

4001 Wentworth Avenue, Chicago, Illinois

PRICE $1.00

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368 Congress Street
Boston, Mass.

PREFACE

Tenth Edition

LALLY COLUMN CONSTRUCTION

The basis of LALLY construction is the LALLY concrete-filled pipe column invented by John Lally, over a quarter of a century ago, to fill the varied demands of modern skeleton frame construction for an adequate and economical building support which meets every need of the twentieth century architect, engineer and builder.

To those who are not fully acquainted with the various and exclusive merits of LALLY COLUMN CONSTRUCTION, full consideration is requested of the important points and brief statements of fact with diagrams, details and photographic reproductions shown in this handbook.

The entire text of this edition has been revised to include the results of tests that are constantly being made in the interests of stronger and better construction. These tests conducted in the largest testing laboratories in the country cannot but be of the greatest value to the architect, engineer and owner. To those who may wish for further assurance than laboratory tests, we can proudly point to a twenty-eight-year time test showing the highest degree possible of performance. Recent wrecking operations preceding street widening projects in Boston have disclosed many LALLY columns in as perfect condition as when installed, over twenty years ago.

Specify

LALLY COLUMNS: All concrete filled steel columns indicated on the plans shall be genuine Lally Columns with steel caps and bases made by the Lally Column Company.

MANUFACTURING PROCESS

Lally Columns are manufactured by the Lally Column Co. of Cambridge, Mass., the Lally Column Co. of Brooklyn, N. Y., and the Lally Column Co. of Chicago, Ill., representing an annual production of hundreds of thousands of Lally Columns. The column is a Shop-Made unit manufactured under the most thorough and careful supervision and inspection, and shipped to the job ready for erection.

Standard tested mild steel pipe, $3\frac{1}{2}$ to $12\frac{3}{4}$ inches in outside diameter are cut to the lengths required. Caps, bases, brackets or splice plates as specified are fitted, and the pipe is then clamped in a vertical position. A machine-mixed stone concrete fill is then deposited in the pipe, and to insure density, the shaft is agitated before initial set takes place by an electric hammer operated on the exterior of the pipe. The vibration compacts the concrete, liberating the confined air and eliminating all air holes and cavities in the aggregate. The resulting material is of considerably greater compressive strength than ordinary cast-in-the-field concrete. The column is then finished by filling the ends level and square and painting red.

Specify

Lally Columns: All concrete filled steel columns indicated on the plans shall be genuine Lally Columns with steel caps and bases made by the Lally Column Company.

MATERIALS AND TESTS

The detail specifications, dimensions and weights of LALLY COLUMNS are given on Plate 5, page 31. The light-weight shell columns are intended for one-story length with concentric loads only. The heavy-weight shell columns are intended for single or multiple-story lengths, with internal reinforcement where necessary, to provide for all building loads and conditions of loading, including wood, steel and reinforced concrete beam and girder construction, as well as the girderless type of reinforced concrete floors.

STEEL SHELL

Numerous tests of the unfilled-steel shell show a modulus of elasticity of 28,000,000 to 30,000,000 lbs. per square inch, a compressive strength of over 50,000 lbs. per square inch and a yield point of approximately 35,000 lbs. per square inch. Plate 1, page 7, shows the uniformity of results secured in tests on the Lally steel shell and the elastic behavior of the material.

CONCRETE CORE

The unreinforced 1:1½:3 concrete core at an age of 28 days gives a compressive strength of not less than 3,000 lbs. per square inch and a modulus of elasticity with sets deducted of almost 4,000,000 lbs. per square inch, with an apparent elastic limit around 1,600 lbs. per square inch.

STEEL-CONCRETE SECTION

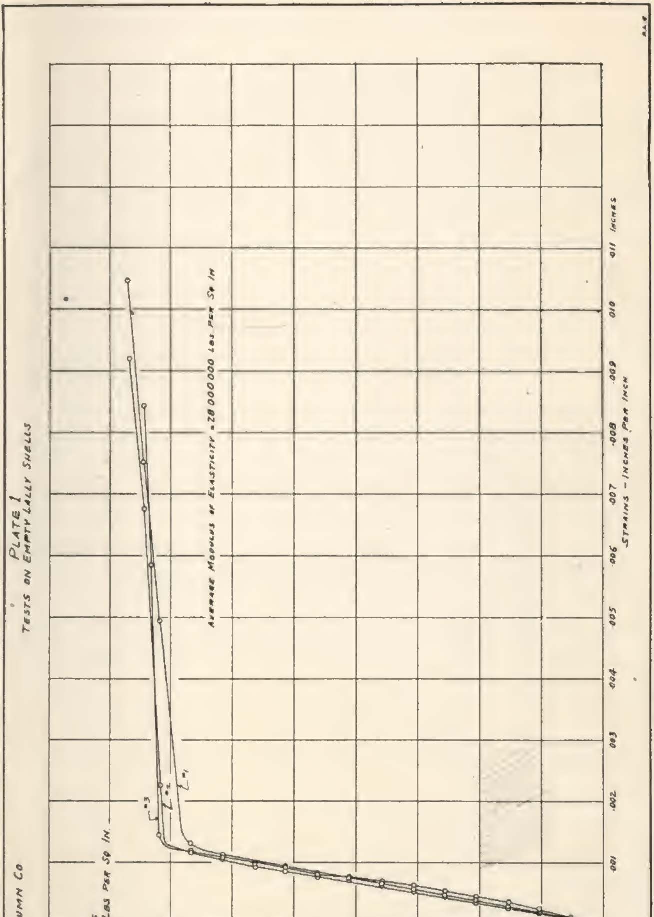
The elastic behavior of the combined section of steel shell and concrete core indicates an exceedingly strong combination with a very economical arrangement of the materials. The apparent elastic limit of the restrained

concrete is increased at least 50% to a value of approximately 2,400 lbs. per square inch. The ratio of stress in the steel shell to stress in the concrete core, as determined by strain gauge measurement, is about 12, with perfect elastic behavior in the composite section. No permanent sets occur in the steel shell below this elastic limit, and the stress-deformation diagram consists of two approximately straight lines intersecting at the elastic limit. Tests at the Watertown Arsenal and the Columbia University Civil Engineering Testing Laboratories show that the strength of the composite section far exceeds the sum of the strength of the two elements and that the column behaves as a true laterally restrained composite concrete steel section.

On Plate 2, page 8, is given the stress-strain curves for both the plain concrete and the concrete core restrained by the shell. In the tests on the restrained concrete core, the machine load was applied directly to the concrete core through cast-iron bearing discs, the steel shell taking up its portion of the load through the lateral pressure and through bond between concrete and steel. On this diagram is also drawn the derived steel curve indicating the computed load supported by the steel at each stage of the test.

Specify

LALLY COLUMNS: All concrete filled steel columns indicated on the plans shall be genuine Lally Columns with steel caps and bases made by the Lally Column Company.


LALLY COLUMN CO
PLATE 1
TESTS ON EMPTY LALLY SHELLS
AVERAGE MODULUS OF ELASTICITY = 28 000 000 LBS PER SQ IN
STRESS
40000 LBS PER SQ IN.
35000
30000
25000
20000
15000
10000
5000
0000
.001
.002
.003
.004
.005
.006
.007
.008
.009
.010
.011 INCHES
STRAINS - INCHES PER INCH
#1
#2
#3

8

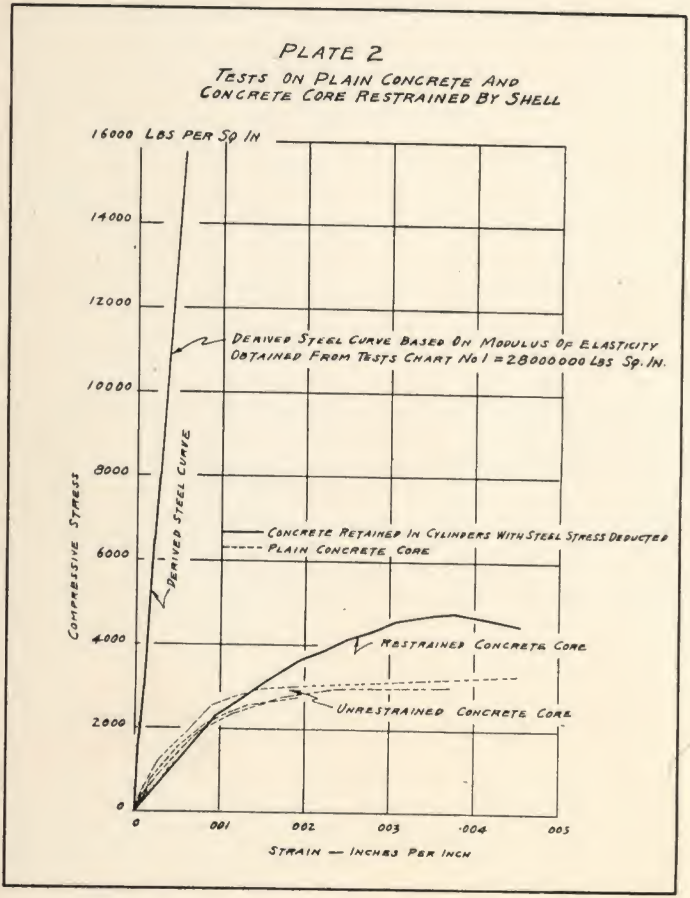


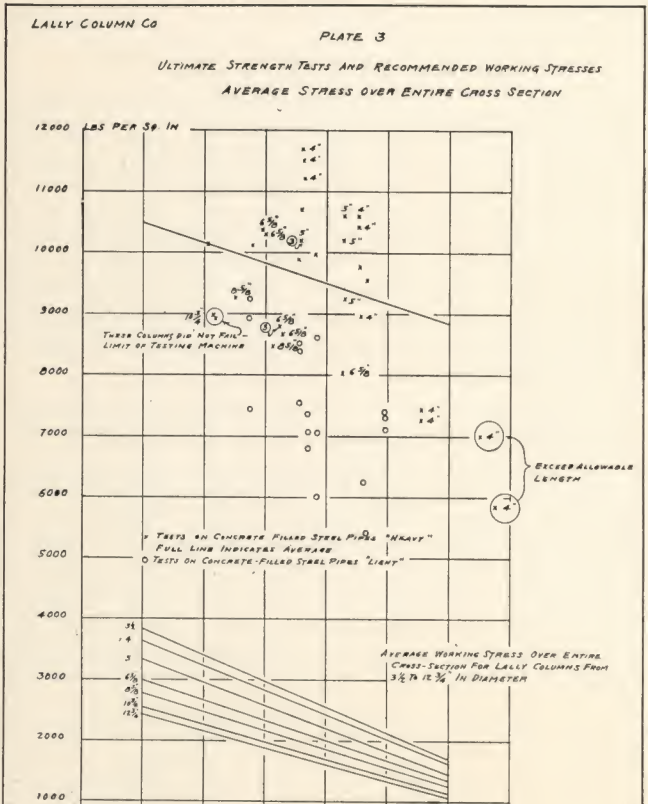
PLATE 2
TESTS ON PLAIN CONCRETE AND
CONCRETE CORE RESTRAINED BY SHELL
16000 LBS PER SQ IN
14000
12000
10000
8000
6000
4000
2000
0
COMPRESSIVE STRESS
DERIVED STEEL CURVE BASED ON MODULUS OF ELASTICITY
OBTAINED FROM TESTS CHART NO 1 = 28000000 LBS SQ. IN.
DERIVED STEEL CURVE
CONCRETE RETAINED IN CYLINDERS WITH STEEL STRESS DEDUCTED
PLAIN CONCRETE CORE
RESTRAINED CONCRETE CORE
UNRESTRAINED CONCRETE CORE
0
001
002
003
·004
005
STRAIN — INCHES PER INCH

STRENGTH OF LALLY COLUMNS

From the results of over one hundred tests on varying column sizes and lengths conducted at the Watertown Arsenal and at Columbia University, the formula used in the design of the LALLY COLUMN has been developed by careful stress-strain measurement and analysis of the test data. This formula gives safe working loads with a factor of about 4 on the Ultimate Strength and 2 on the Elastic Limit. The strength of base plates, brackets and connections has been determined not only by analysis but by actual test to a factor of four times the recommended safe working loads.

The average stress on column sections varying from 3½ to 12¾ inches as computed by the LALLY formula have been plotted on Plate 3, page 10. On the top of the sheet have been plotted the average ultimate stresses secured in tests on full-length column sections at the Watertown Arsenal of some 50 specimens of various diameters and ratios of $^{l}/_{d}$. Through these test results, the average full line has been drawn. It will be noted that the computed working stresses by this formula provide in all cases a factor of not less than four (4) on the actual ultimate test results developed by the full length columns.

When necessary to provide for greater loads than shown in the strength table, LALLY COLUMNS may be reinforced with an inner pipe of at least four (4) inches less diameter than the outer shell or with structural steel shapes. (See Pages 28 and 29.) Such reinforcement is faced to insure equal lengths and full bearing of both the outer shell and the reinforcing steel. The safe loads for REINFORCED LALLY COLUMNS are computed by the same formula as the unreinforced, the quantity, A_s representing the total area of shell and reinforcement.


LALLY COLUMN CO
PLATE 3
ULTIMATE STRENGTH TESTS AND RECOMMENDED WORKING STRESSES
AVERAGE STRESS OVER ENTIRE CROSS SECTION
12000 LBS PER SQ. IN
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0000
THESE COLUMNS DID NOT FAIL - LIMIT OF TESTING MACHINE
EXCEED ALLOWABLE LENGTH
x TESTS ON CONCRETE FILLED STEEL PIPES "HEAVY"
FULL LINE INDICATES AVERAGE
O TESTS ON CONCRETE-FILLED STEEL PIPES "LIGHT"
AVERAGE WORKING STRESS OVER ENTIRE CROSS-SECTION FOR LALLY COLUMNS FROM 3½ TO 12¾" IN DIAMETER
W=(Ac+12As)(1200-10 l/r) - FACTOR OF SAFETY = 4
10 20 30 40 50 60 70 80 90 100 110 120 130
l/r
5 10 15 20 25 30 35 40 45

FIRE RESISTANCE

The value of the Lally Column in fire-resisting construction has been frequently demonstrated both in actual fires and scientifically conducted fire tests. This type of column section without additional exterior protection has withstood the flames and high temperatures of some of the greatest fires, such as the Chelsea conflagration in April, 1908, the Salem Fire in June, 1914, the Standard Oil Fire at Greenpoint, N. Y., in September, 1919, and the fire in the Edison Phonograph Works at West Orange, New Jersey, in December, 1914. In this latter fire, large pieces of steel and cast-iron melted in the same building in which concrete-filled pipe columns were used and there were evidences of exposed concrete having been fused. The defect produced on the concrete-filled steel pipe columns was a slight lateral bend which was generally less than one inch. A complete report on the fire in the Edison Phonograph Works was prepared under the joint auspices of the National Fire Protection Association and the National Board of Fire Underwriters and gives in detail the effects of fire on the various materials which entered into the construction.

In the Underwriters' Laboratories at Chicago, Ill., 1917–1919, two types of Lally Columns were tested in a series of fire tests of structural steel, reinforced concrete, steel pipe and cast-iron columns. The Lally Columns were unprotected on the exterior surface. The details of the construction of the test columns are shown on Plate 4, page 13. These columns were tested under Standard Time-Temperature Fire curve conditions while supporting loads in excess of the recommended design loads. As a result of the tests, the comparative fire-resisting

ratings of Lally Columns were determined as 25 minutes for the unreinforced, which was 11% overloaded during the test, and 45 minutes for the reinforced section, which was 3% overloaded during the test. The actual test runs were 36 minutes and 1 hour 11¾ minutes respectively. Compared to these ratings, unprotected structural steel and round cast-iron columns were granted tentative ratings of only 10 and 20 minutes respectively. The Lally Column ratings would probably have been still further increased if the test loads had not exceeded the safe working values recommended.

Specify

Lally Columns: All concrete filled steel columns indicated on the plans shall be genuine Lally Columns with steel caps and bases made by the Lally Column Company.

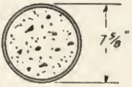
PLATE 4

UNDERWRITERS' FIRE TEST
OF
LALLY COLUMNS

ENDS NOT RESTRAINED
1917 – 1919
NO PROTECTIVE COVERING

UNREINFORCED

CONCRETE 1:1½:3
A_s = 6.92 □"
A_c = 38.74 □"



REINFORCED

CONCRETE 1:1½:3
A_s = 18.32 □"
A_c = 40.11 □"

REINFORCEMENT
4–3½×3½×⅜ L's

LENGTH	= 12'–5"	LENGTH	= 12'–8¾"
RADIUS OF GYRATION	= 2.34	RADIUS OF GYRATION	= 2.24
LOAD UNDER TEST	= 114500 LBS.	LOAD UNDER TEST	= 236000 LBS.
DURATION OF TEST	= 0 HRS. – 36 MINS.	DURATION OF TEST	= 1 HR. – 11¾ MINS.
RECOMMENDED DESIGN LOAD	= 103000	RECOMMENDED DESIGN LOAD	= 229000

SAFE FIRE RESISTING PERIODS
DERIVED FROM TEST

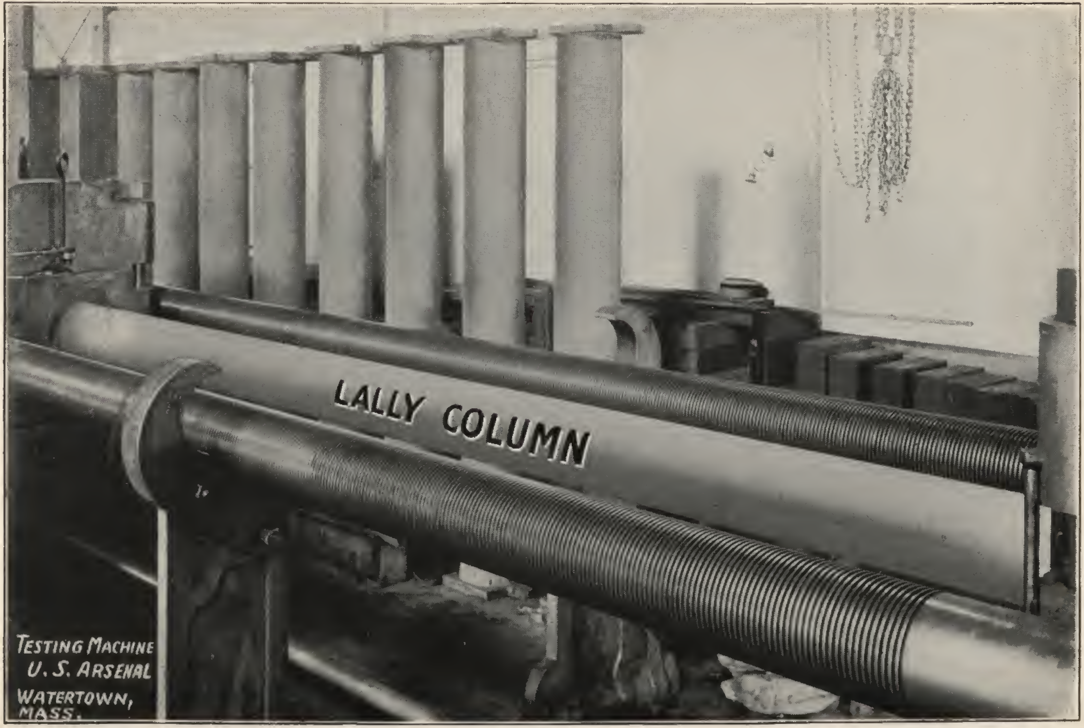
UNREINFORCED, WITH MIN. AREA OF 35 □" = 0 HRS – 25 MINS
REINFORCED, WITH MIN AREA OF 45 □" = 0 HRS – 45 MINS.

Cast-Iron Cap.—Not used in Lally Construction.

Cap bears unevenly and loosely on the column shell. The Photograph shown is of a Test Specimen at the Watertown Arsenal. Ultimate Strength = 84,200 lbs.

Lally Structural Steel Bracket Cap.

Photograph of a Test Specimen at the Watertown Arsenal. Ultimate Strength = 621,000 lbs.



Testing a Lally Column at the U. S. Arsenal, Watertown, Mass.

COMPARISONS

Lally Columns possess the following advantages over other types of columns.

Cast Iron: The safe carrying capacity of Lally Columns is more dependable than cast-iron columns because of the uncertain thickness of the shells of cast-iron columns, due to floating, sagging or displaced cores, blow-holes, etc. The caps of cast-iron columns are frequently weak, due to cooling strains in the ribs and crown plates. The defects of cast-iron columns are difficult to discover by the usual methods of inspection.

Steel "H" or "I" Beam Columns: Lally Columns are of more efficient cross section for carrying loads. They are much more economical in that they can be much more easily adjusted to the load to be carried. They have twice the resistance to deterioration as only one side of the shell can be attacked by rust when painting is neglected.

Wood Posts: Lally Columns being smaller permit more light and air to enter, an important point in their favor for industrial construction. Lally Columns show no unsightly cracks in their surface as wood posts do. In basements of apartments, residences, stores, etc., Lally Columns are neater, more durable, occupy less space, and are always more easily obtained.

Brick Piers: Lally Columns are decidedly cheaper, smaller, more durable and more easily erected than brick piers. Brick piers are subject to settlement due to green mortar, and their edges break off when passing objects strike them.

TWENTY REASONS WHY
Architects and Engineers Specify LALLY COLUMNS

1. Because they are the most durable building support made.

2. Because they are so great a factor in public and personal safety. In our twenty-five years' experience, during which millions of Lally Columns have been installed, there has not been one accident where the columns were at fault.

3. Because the Lally Column Company, the originator of concrete-filled columns, is constantly making improvements covering the various changes made in Building Construction, and is generally recognized as being the leading concrete-filled column manufacturer.

4. Because the three Lally Companies are the only concerns that make the manufacture of columns their sole business. Lally Columns are made in modern factories thoroughly equipped with special machinery for the manufacture of columns giving assurance of accuracy and easy adjustment in the field.

5. Because Lally Columns are the only columns that have their outer steel shell made to conform to a special analysis which assures from thirty to forty per cent more compressive strength than is found in columns manufactured from pipe not conforming to this analysis.

6. Because of our various beam and floor connections designed and made to suit any conditions, all of which have been tested and approved by leading engineers.

7. Because of the superior quality and scientifically correct proportions of the filling of trap rock, sand, and cement.

8. Because our special concrete — the highest grade of such material known to engineering science — is automatically mixed, measured, and deposited in place, under

the supervision of an official inspector, rendering errors in measurement or mixing impossible.

9. Because of the special process used in filling there is an entire elimination of air holes, voids, and cavities in the concrete.

10. Because by our various systems of reinforcement we are able to use a comparatively small diameter with absolute safety and make the most compact fireproof column ever manufactured.

11. Because Lally Columns, being round, are neat in appearance and occupy less space than any other column of equal carrying capacity.

12. Because the radius of gyration of pipe, being greater than that of any other section, allows a greater fiber stress per unit of area, consequently this is the most efficient of all column sections.

13. Because the uncertainty of cast-iron bracket caps is conceded by all authorities and the Lally Steel Bracket Caps eliminate all danger of failure. The contrast between these two types is strikingly shown by the photographs reproduced on other pages of this catalogue.

14. Because a full line of tests from the United States Arsenal proves the all around superiority of Lally Columns.

15. Because their absolute reliability for the safe load that we claim for them is assured both by these tests and their long and uniformly satisfactory use under especially severe conditions. That Lally Columns have emphatically stood the test of service is most convincingly shown by the many unsolicited testimonials and photographs received from Architects, Contractors, and Owners.

16. Because Lally Columns, while of the highest quality, cost less in the same carrying capacity than any other columns.

17. Because Lally Columns can be furnished according to specifications and shipped ready to be set up in less

than one-fourth the time that a cast-iron or a steel built-up column can be turned out, which means a large saving of time and consequently an additional saving of money. It also means the utmost expediency with thorough and lasting satisfaction to customers and clients.

18. Because fire, water, and weight sufficient to destroy other columns do not affect a Lally Column.

19. Because they withstood to a remarkable degree some of the severest fires on record, as shown by photographs reproduced in this book.

20. Because the fire tests on columns made by the Associated Factory Mutual Fire Insurance Co., the National Board of Fire Underwriters, and the Bureau of Standards, Department of Commerce, jointly conducted at the Underwriters' Laboratories, Chicago, Ill., show the absolute superiority of a Lally reinforced column in fire.

Approvals

The Lally Column is endorsed by architects and engineers throughout the country, and approvals have been granted for its use by all the leading city building departments after extensive tests and investigations. Its adaptability to all forms of building construction, its economy in first cost and in floor space occupied, its speed of erection, as well as its strength, durability and practical performance, have been demonstrated by successful and uniformly satisfactory use under especially severe conditions.

We regret that it seems necessary to express to architects and engineers the strong advisability of a positive insistence on the use of Lally Columns after they specify them. There is a tendency on the part of a number of unscrupulous people to substitute columns that are distinctly inferior to the Lally Columns specified. This has been done without consideration of the great injustice to architect, engineer, and owner, in a part of the construction so vitally important as the supports of a modern building.

That this practice is exactly opposite to that of most contractors and builders, who take a worthy pride in their work, makes it all the more reprehensible, and all those concerned in any way with building construction who insist on Lally Columns, and see that they are erected according to specifications, will render a service not only to us but to the building trade, the professions so intimately connected with it, the owners of the buildings, and the general public.

6-1-'23-2M.

City of Boston.
Building Department.
Office of the Building Commissioner,
Ninth Floor, City Hall Annex,
Boston 9.

JOHN H. MAHONY,
Building Commissioner.

CHARLES S. DAMRELL,
Clerk of Department.

August 27th
1 9 2 3

Lally Column Company,
Erie & Albany Streets,
Cambridge 39, Mass.

Dear Sirs:

Approval is hereby given for general use in the City of Boston for buildings not exceeding one hundred feet (100') in height, of the LALLY COLUMNS manufactured by you.

They are to be Concrete Filled Steel Pipe, faced on the ends, provided with Caps, Brackets and Bases, as computed and designed in accordance with tables, standards and details contained in the data filed in this office.

These columns must be inspected by a representative of this Department during process of manufacture and must bear his stamp of approval. This approval is granted on condition that the standard of the materials and construction be kept up to those established by tests, copies of which are filed in this office, and that you will make any further tests that this Department may require.

Respectfully yours,

John H. Mahony

Building Commissioner.

P. J. REVILLE
SUPERINTENDENT

HENRY BRUCKNER
PRESIDENT, BOROUGH OF THE BRONX

CITY OF NEW YORK
BUREAU OF BUILDINGS
BOROUGH OF THE BRONX
S. E. COR. THIRD AVENUE AND TREMONT AVENUE
OFFICE OF THE SUPERINTENDENT

TH-MKF

June 19th, 1923.

Lally Column Co. of New York,
Calyer & Russel Streets,
Borough of Brooklyn, New York.

Gentlemen:

Supplimenting my approval of Jan. 31, 1923, of the improved forms of "Lally" columns and connections manufactured by the Lally Column Co. of New York, a modification is herewith granted for the general use of the same in buildings not exceeding 75'-o" in height; this modification being issued, subject to the general specifications and conditions as set forth in my approval issued on Jan. 31, 1923.

Very truly yours,

P J Reville

Superintendent of Buildings,
Borough of the Bronx.

The City of New York
Office of the
President of the Borough of Brooklyn
BUREAU OF BUILDINGS
ALBERT E. KLEINERT, SUPERINTENDENT

EDWARD RIEGELMANN
PRESIDENT
JOSEPH A. GUIDER
COMMISSIONER OF PUBLIC WORKS
JOSEPH FENNELLY
ASSISTANT COMMISSIONER OF PUBLIC WORKS

April 5th, 1923.

Lally Column Company,
c/o George E. Strehan,
112-W. 42nd St., Manhattan.

Dear Sir:

Supplementing and superceding the previous approvals issued to your Company by this bureau, for the Borough of Brooklyn, I have to advise you that as a result of recent test held on Lally Column, sections and brackets connections etc., at Columbia University, on April 20th, 1922. That the data and results shown, also the formula deducted therefrom, are hereby approved for general use in this borough for cement filled steel shelled columns up to and including structures 75' high of a non-fireproof character. This data is contained on blue-print sheets #1 to 29 inclusive, as compiled by Mr. George E. Strehan, consulting engineer in 1922. The formula for calculation of these columns, ie. $P=(Ac+12AS)\ (1200-18\ {}^{l}/d)$ is accepted as a standard for steel shell concrete filled columns, in this borough.

It is expressly understood that all shells or pipe shall be (new). That all columns for use in this borough shall be inspected during manufacture and properly stamped with an approved stamp at the time of manufacture, and that your company shall be responsible for all work done with your material or product, failing in which this approval will be R E V O K E D .

Yours very truly,

Albert E. Kleinert

Albert E. Kleinert,
Superintendent of Buildings.

JCS*EP
File 105

CITY OF NEW YORK

BOROUGH OF MANHATTAN

JULIUS MILLER

PRESIDENT OF THE BOROUGH

BUREAU OF BUILDINGS

MUNICIPAL BUILDING

CHARLES BRADY

SUPERINTENDENT OF BUILDINGS

ADDRESS ALL COMMUNICATIONS TO "SUPERINTENDENT OF BUILDINGS"

May 23, 1923.

Lally Column Company of New York,
Calyer & Russell Streets,
Brooklyn, New York.

Gentlemen:

Re: LALLY COLUMNS

Enclosed I am sending you bulletin of approval issued by this bureau for your column.

This approval is granted on condition that the standard of the materials and construction be kept up to those established by the tests, and that you will make any further tests that this bureau may require.

Yours truly,

Charles Brady

Superintendent of Buildings.

JDM-BH

JDM-BH

BULLETIN NO. 12-1923
New Form of Column Construction

LALLY COLUMNS:

The following modification of the previously approved form of Lally Column, manufactured by the Lally Column Company of New York, Calyer and Russell Streets, Brooklyn, New York, is approved for general use in buildings not exceeding seventy-five feet in height in the Borough of Manhattan.

Concrete filled steel pip faced at the ends, provided with special forms of bases, caps, brackets and splices and computed and designed in accordance with tables and standard details contained in a set of twenty-nine sheets dated from May 26 to October 5, 1922, derived from data given in letter of Mr. George B. Strehan dated September 13, 1922.

These columns are brand marked "LALLY COLUMN" and to be acceptable must be stamped as approved by a representative of this bureau or of the Bureau of Buildings of the borough in which the columns are manufactured.

Charles Brady

Superintendent of Buildings.

Dated: May 23, 1923.

TELEPHONE 3400 HUNTERSPOINT

CITY OF NEW YORK
BUREAU OF BUILDINGS
BOROUGH OF QUEENS
LONG ISLAND CITY

June 11, 1923

Lally Column Company of New York,
Calyer & Russell Streets,
Brooklyn, New York.

Dear Sirs:-

Approval is hereby given for general use in the Borough of Queens for buildings not exceeding seventy-five feet in height of the Lally Columns manufactured by you.

They are to be concrete filled steel pipe faced at the ends, provided with special forms of bases, caps, brackets and splices and computed and designed in accordance with tables and standard details contained in a set of twenty-nine sheets dated May 26, to October 5, 1922, derived from data given in letter of Mr. George E. Strehan dated September 13, 1922.

These columns are brand marked "LALLY COLUMN" and to be acceptable must be stamped as approved by a representative of this Bureau or of the Bureau of Buildings of the Bureau of which the columns are manufactured.

This approval is granted on condition that the standard of the materials and construction be kept up to those established by the tests, and that you will make any further tests that this bureau may require.

Respectfully,

John Moore

JWM:BB

Superintendent of Bldgs.

BUREAU OF BUILDINGS

BOROUGH OF RICHMOND

BOROUGH HALL

WM. J. McDERMOTT
SUPERINTENDENT

August 13, 1923.

STATEN ISLAND, NEW YORK CITY,..........192

Lally Column Company of New York,
Colyer & Russell Streets,
Brooklyn, N. Y.

Gentlemen:

As a result of the tests conducted at the Columbia University Testing Laboratory on November 5, 1921 and April 20, 1922, under the supervision of the Bureau of Buildings of the City of New York, approval is hereby granted for general use in the Borough of Richmond of the Lally Columns, including special bases, caps, brackets, splices and connections for the columns, also the formula for calculation of the columns, P-(Ac plus 12 As) (1200-18 L/D) all in accordance with the data contained on a set of twenty-nine blue print sheets dated from May 26 to October 5, 1922 compiled by Mr. George E. Strehan, Consulting Engineer, subject to the following conditions: continuous column construction is limited to buildings not over 75 feet in height. The columns to be made of new mild steel pipe, filled with machine mixed concrete, 1:1 1/2: 3 (Portland cement bank sand and 1/2" crushed traprock or quartz aggregate. These columns to be brandmarked "LALLY COLUMN" and must be stamped as approved by a representative of this Bureau or the Bureau of the borough in which the columns are manufactured.

The electric weld is not accepted as a positive connection in distributing stresses or transmitting loads or as a substitute for mechanical anchorage to the concrete or steel but is accepted as a supplemental device.

Respectfully,

Wm J McDermott

Superintendent of Buildings.

ABC/WPR

WM. T. MARCH,
SUPT. OF PARKS

ERNEST W. JOHNSON,
SUPT. OF PLAYGROUNDS

FRANK X. TEWES,
CITY ARCHITECT

City of St. Paul
Department of Parks, Playgrounds
and Public Buildings
HERMAN C. WENZEL, COMMISSIONER
IRVING C. PEARCE, DEPUTY COMMISSIONER
OFFICE OF COMMISSIONER
219 COURT HOUSE

November 10, 1923.

Lally Column Company,
4001 Wentworth Avenue,
Chicago, Illinois.

Gentlemen:

Mr. Fisher, your representative engineer, called at this office yesterday and asked that we address a letter to you stating whether or not your columns are in compliance with our ordinances for use in this city.

This letter will confirm my statements to him that it will be allowable for you to sell and erect these columns in St. Paul for non-fireproof construction.

Yours very truly,

H. S. Bronson

Superintendent of Inspection.

HSB..U

Section of standard Lally Column. Steel shell, concrete filled.

Section of Lally Column reinforced with round bar. Used when but a small amount of reinforcing is necessary.

Section of Lally Column with pipe reinforcement. This type is used where additional area is necessary or as a legally fireproofed column. In the latter case the inner column is figured to carry the load.

Section of Lally Column with angle iron reinforcement. Ordinarily used where a large amount of metal area is required. This type is also the most compact fireproofed column manufactured. The four angle irons as well as the concrete within the radius of same are designed to carry the load. The outer shell and the concrete outside the radius of the angles act as fireproofing and make the column practically indestructible.

Information for Ordering

Length. In ordering Lally Columns always give the length over all, that is, the length from the bottom of the base plate to the top of the cap plate.

Diameter. Specify the diameter, and if 4 inches diameter or under specify if light or heavyweight columns are required.

Bases. In ordering bases specify size and style, whether standard, or built-up bracketed type.

Caps. Bracketed caps are advised where the load is not applied directly to the column shaft, and steel cap fastened (without brackets) when the load is direct. In ordering specify whether steel cap fastened or bracket cap, one, two, three, or four-way. On page 44 we have suggested the spacing of holes on both steel-fastened caps and bracketed caps. Our caps are all shop-made and can be designed to meet any and all requirements. If the conditions imposed are not standard, furnish us with a detailed sketch of what you require and we will follow your design.

Steel-Fastened Bases. Bases that rest on steel beams are similar to our fastened caps inverted, so in ordering follow the same instructions that are given for caps, and in addition, furnish us with a sketch showing the relationship between caps and bases, that is, whether the beams carried by the cap and the beams under the base run in the same direction.

Side Brackets. In ordering side brackets a sketch is advisable showing the distance down from the top of the cap to the top of the plate on the side bracket, and the relationship between the cap and the bracket.

Fillers. Specify the height of the filler and size and weight of the beam carried.

Beveled Roof Plates. Specify the pitch of the beams and furnish detail showing same.

SPECIFICATIONS, DIMENSIONS AND WEIGHTS

COLUMN SHELL — Standard Mild Steel Pipe, Black
Cut and Slotted to Receive Beam Connections

CONCRETE FILL — Machine Mixed and Agitated with Electric Hammer on Exterior of Pipe
1 Part — Portland Cement
1½ Parts — Clean Sharp Sand
3 Parts — ½″ Crushed Blue Trap Rock or Quartz Gravel

CAPS AND BASES — Structural Steel Plates

Dia. of Col.	Outside Dia. of Pipe	Inside Dia. of Pipe	Thickness of Metal	Area of Metal	Area of Concrete	Weight of Pipe per Foot	Weight per Foot of Filled Column
Ins.	Ins.	Ins.	Ins.	Sq. Ins.	Sq. Ins.	Pounds	Pounds
LIGHT WEIGHT							
3½	3.500	3.260	0.120	1.27	8.35	4.280	13
4	4.000	3.732	0.134	1.63	10.94	5.470	17
HEAVY WEIGHT							
3½	3.500	3.068	0.216	2.23	7.39	7.575	15
4	4.000	3.548	0.226	2.68	9.89	9.109	20
4½	4.500	4.026	0.237	3.17	12.73	10.790	24
5	5.000	4.506	0.247	3.69	15.95	12.538	29
5½	5.563	5.047	0.258	4.30	20.01	14.617	36
6⅝	6.625	6.065	0.280	5.58	28.89	18.974	49
7⅝	7.625	7.023	0.301	6.92	38.74	23.544	64
8⅝	8.625	7.981	0.322	8.40	50.03	28.554	81
9⅝	9.625	8.941	0.342	9.97	62.79	33.907	100
10¾	10.750	10.020	0.365	11.91	78.86	40.483	123
12¾	12.750	12.000	0.375	14.58	113.10	49.562	169

SAFE LOADS FOR LALLY

	Dia. of Col. Inches	Weight Per Foot Lbs.	Area of Steel Sq. In.	Area of Concrete Sq. In.	Unbraced Length of Column in Feet					
					6	7	8	9	10	11
Light Weight	3½	13	1.27	8.35	26.1	24.2	22.2	20.3	18.3	16.4
	4	17	1.63	10.94	35.6	33.4	31.2	29.0	26.8	24.6
Heavy Weight	3½	15	2.23	7.39	37.9	35.1	32.3	29.4	26.7	24.0
	4	20	2.68	9.89	49.2	46.1	43.1	40.1	37.0	33.9
	4½	24	3.17	12.73	61.8	58.5	55.3	52.0	48.8	45.5
	5	29	3.69	15.95	75.6	72.0	68.6	65.2	61.7	58.2
	5½	36	4.30	20.01	92.1	88.3	84.6	80.8	77.1	73.3
	6⅝	49	5.58	28.89	128.3	124.2	120.0	115.8	111.7	107.5
	7⅝	64	6.92	38.74	166.0	161.4	156.9	152.3	147.8	143.2
	8⅝	81	8.40	50.03	211.1	206.1	201.1	196.1	191.0	186.0
	9⅝	100	9.97	62.79	259.2	253.8	248.3	242.8	237.4	231.9
	10¾	123	11.91	78.86	319.1	313.1	307.2	301.3	295.4	289.4
	12¾	169	14.58	113.10	421.9	415.4	408.8	402.3	395.8	389.2

The following formula may be used in computing the safe carrying capacity of Light and Heavy weight Lally Columns:

$$P = \left(A_c + 12A_s\right)\left(1{,}600-24\frac{l}{d}\right)$$

P = Safe carrying capacity in pounds
As = Area of steel in square inches
Ac = Area of concrete in square inches
l = Length of column in inches
d = Diameter of column in inches

Limit of length = 40 diameters (l/r = 120)

*Radius of gyration equals 1/10 quantity in this column.

COLUMNS IN THOUSANDS OF POUNDS

Dia. of Col. Inches		Unbraced Length of Column in Feet									*Max. Length in Feet
		12	13	14	15	16	17	18	19	20	
Light Weight	3½	14.5									11.91
Light Weight	4	22.4	20.2								13.71
Heavy Weight	3½										11.64
Heavy Weight	4	30.9	27.9								13.37
Heavy Weight	4½	42.3	39.0	35.8	32.5						15.10
Heavy Weight	5	54.7	51.3	47.8	44.3	40.9	37.4				16.83
Heavy Weight	5½	69.6	65.8	62.1	58.3	54.6	50.8	47.1	43.3		18.78
Heavy Weight	6⅝	103.4	99.2	95.0	90.9	86.7	82.6	78.4	74.2	70.1	22.45
Heavy Weight	7⅝	138.6	134.1	129.7	125.0	120.5	115.9	111.4	106.8	102.3	25.92
Heavy Weight	8⅝	181.0	175.9	170.9	165.9	160.8	155.8	150.8	145.8	140.7	29.38
Heavy Weight	9⅝	226.5	221.0	215.6	210.1	204.6	199.2	193.7	188.3	182.8	32.84
Heavy Weight	10¾	283.5	277.6	271.6	265.7	259.7	253.8	247.9	241.9	236.0	36.74
Heavy Weight	12¾	382.8	376.2	369.7	363.2	356.7	350.1	343.6	337.1	330.6	43.77

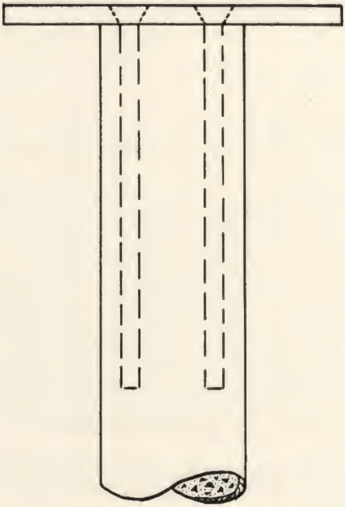
The following formula may be used in computing the safe carrying capacity of Light and Heavy weight Lally Columns:

$$P = \left(A_c + 12A_s\right)\left(1{,}600 - 24\frac{l}{d}\right)$$

P = Safe carrying capacity in pounds
As = Area of steel in square inches
Ac = Area of concrete in square inches
l = Length of column in inches
d = Diameter of column in inches

Limit of length = 40 diameters (l/r = 120)

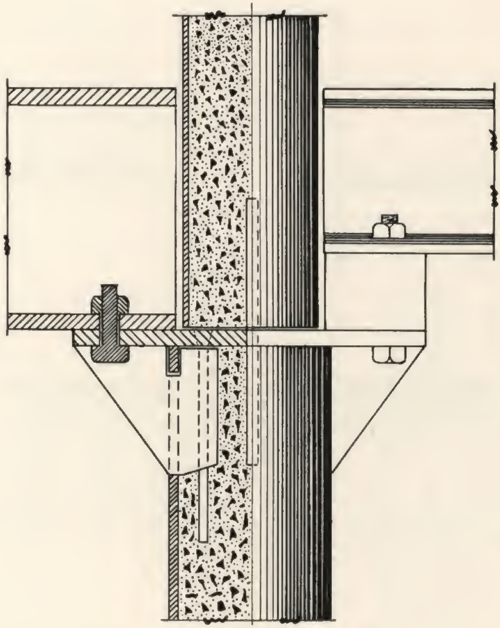
*Radius of gyration equals 1/10 quantity in this column.



TYPE "A"

Standard Fastened Steel Plate Caps.

A steel plate fastened to the column, using long bolts with countersunk heads, embedded in the concrete. This plate is also electrically welded to the shell of the column. This plate is practically immovable and is used for concentric loads. Fastened steel plate caps are made any size or thickness to meet requirements.

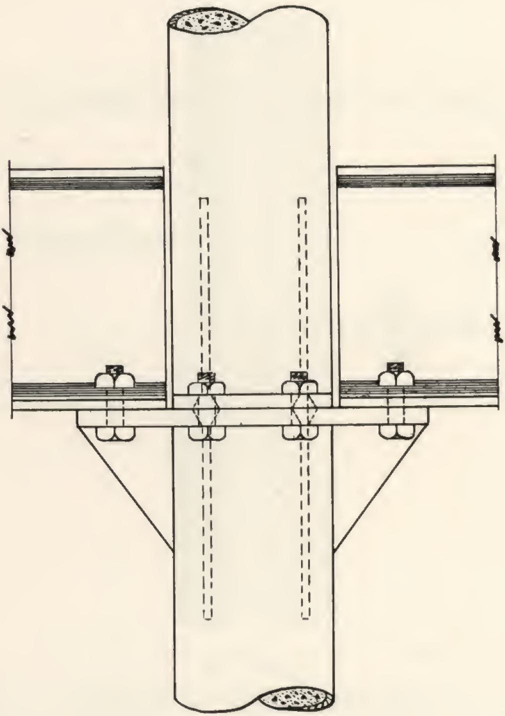


TYPE "B"

Continuous Column Connection.

This connection consists of a crown plate fastened to the column with countersunk head bolts welded to the plate and embedded in the concrete filling. Steel brackets are inserted through slots in the column shaft, and a pintle in the column above fits into a hole in the plate below.

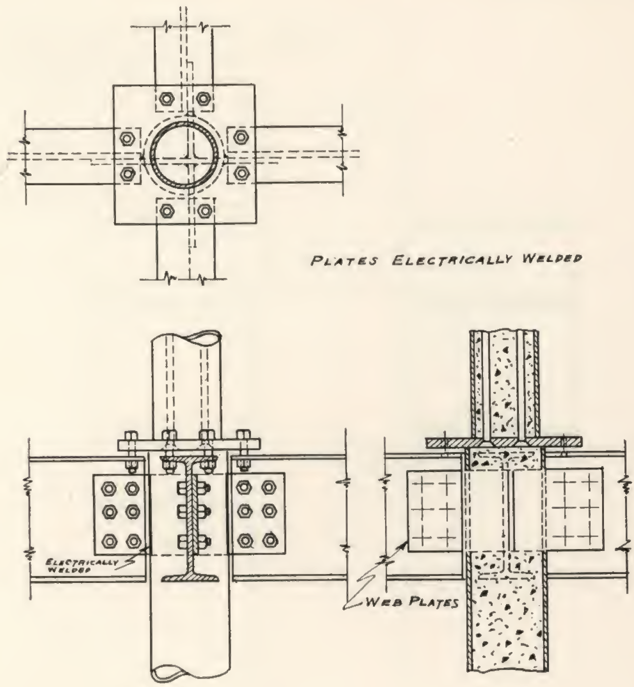
Where beams are of different depths, fillers are provided.



TYPE "C"

Continuous Column Connection with Base above Bolted to Cap.

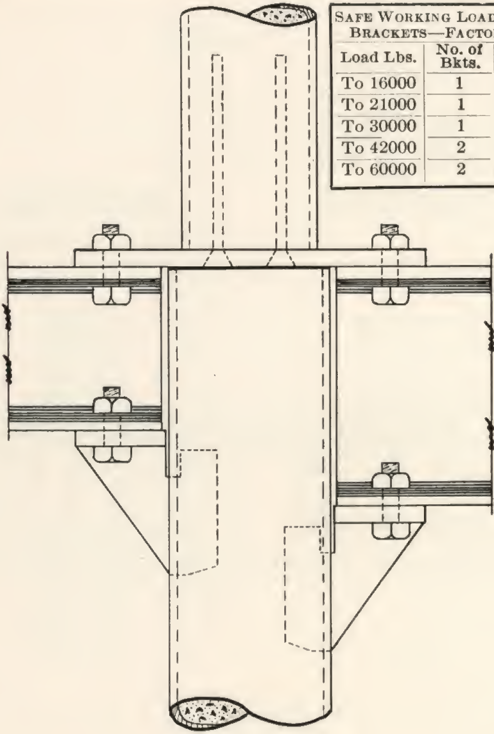
Used where greater rigidity is required than in the pintle type connection.



TYPE "D"

Continuous Column Connections with Web Tie.

This type is specified wherever it is desired to eliminate the brackets ordinarily used because of their protrusion below the ceiling line. Note that we provide for a web tie rather than a flange tie and that a steel base is fastened to the upper column. When erected, this base is bolted to the upper flanges of the beams. For number, size and spacing of bolts used in these connections see pages 48–49.

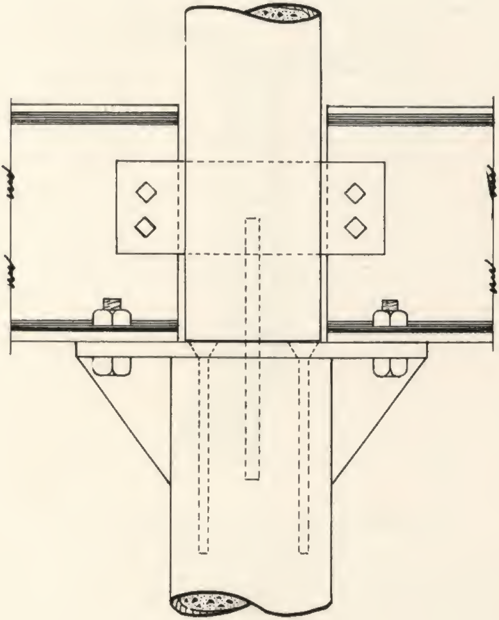


SAFE WORKING LOADS OF STAND BRACKETS—FACTOR OF FOUR		
Load Lbs.	No. of Bkts.	Thickness in Inches
To 16000	1	½
To 21000	1	⅝
To 30000	1	¾
To 42000	2	⅝
To 60000	2	¾

TYPE "E"

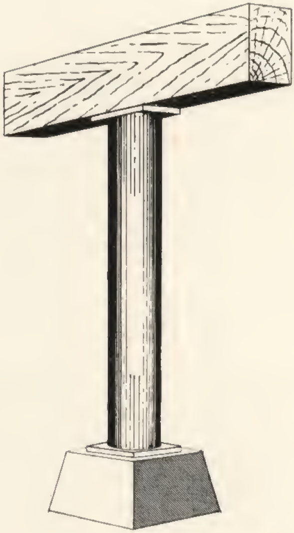
Continuous Column Connection with Double Flange Tie and Side Brackets.

A very strong and rigid connection where double flange ties are necessary.



TYPE "F"

Continuous Column Connection with Pintle and Web Tie.



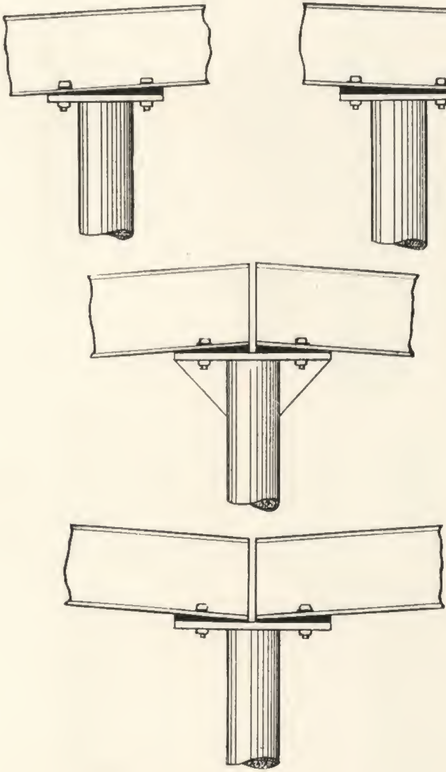
Lally Columns for House and Piazza.

We carry in stock ready for immediate shipment, Lally light-weight columns 3½ and 4 inches in diameter, every 2 inches in length from 6 ft. to 8 ft. 6 inches, and every 6 inches from 9 ft. to 12 ft.

Piazza columns 3 inches in diameter, every 6 inches from 2 ft. to 5 ft.

These columns have loose steel plate caps and bases. Lally Columns for a continuance veranda support in apartment houses, where either steel or wood beams are used, are unsurpassed.

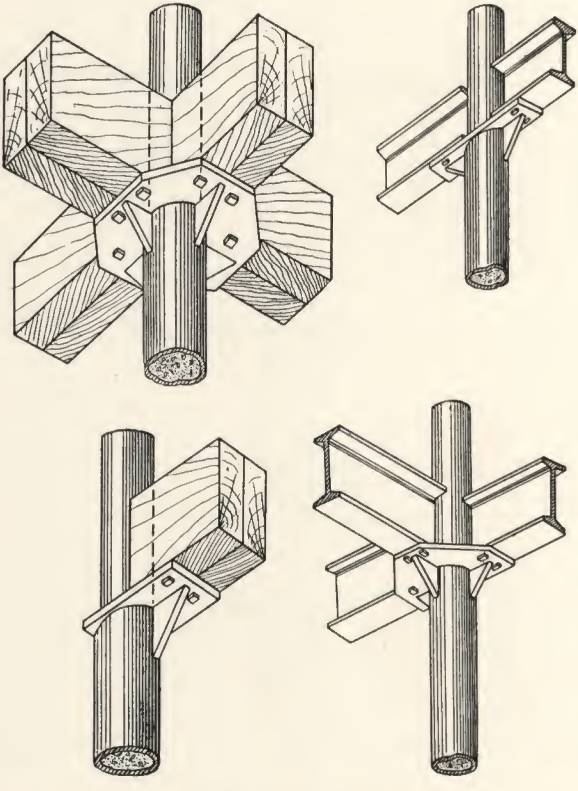
Many architects use Lally Columns in connection with pergola or drying yard work, enclosing them in a cypress casing and embedding them in a cement footing below the frost line.



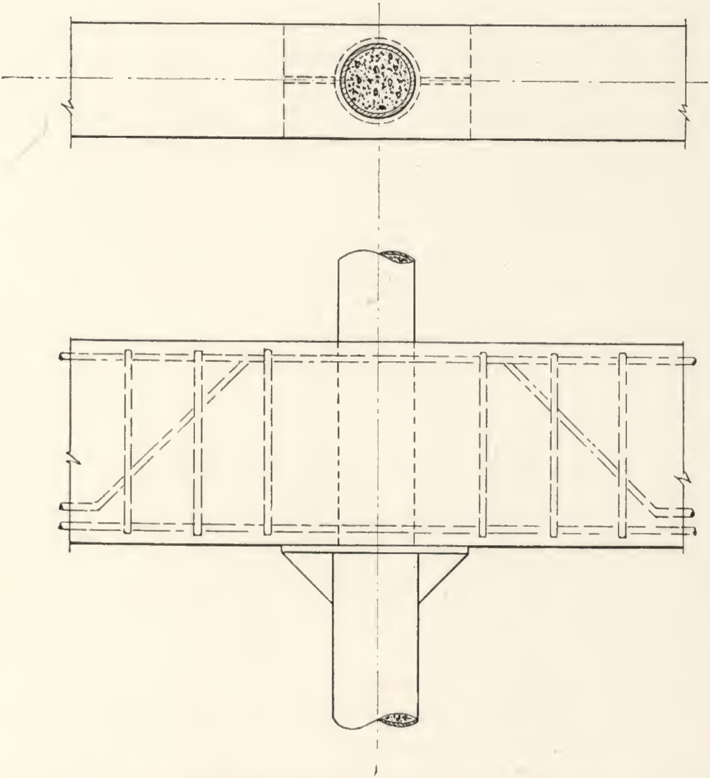
Beveled Roof Plates.

Beveled roof plates are made of cast iron beveled to take the pitch of the beams or girders, and ordinarily are used in connection with steel plate fastened caps. The steel caps, the beveled roof plates, and the girders or beams are all fastened securely.

When the beams resting on the column caps are of wood we recommend that the beams be notched where they rest on the caps, to provide for the slope of the roof. We make this suggestion in the interest of economy.



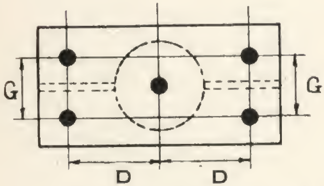
Illustrations of Type "B" LALLY COLUMN 1, 2, 3 and 4-way Bracket Caps used in continuous LALLY COLUMN construction.



LALLY COLUMNS in Concrete Beam Construction.

We provide LALLY COLUMNS for concrete beam construction with caps any size required and with brackets sufficient in number and size to sustain the load that the column will carry.

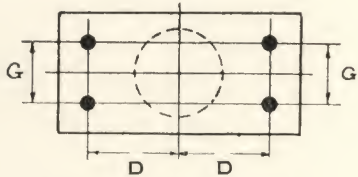
Steel Bracket Caps



Outside Diam. of Col.	Distance "D"
3½″	4¼″
4″	4½″
4½″	4¾″
5″	5″
5½″	5¼″
6⅝″	6¼″
7⅝″	6¾″
8⅝″	7¼″
9⅝″	7¾″
10¾″	8¼″
12¾″	9″

Distance "D" is the same for 1-way, 2-way, 3-way and 4-way bracket caps, also for side brackets.

Steel Caps Fastened
No Brackets



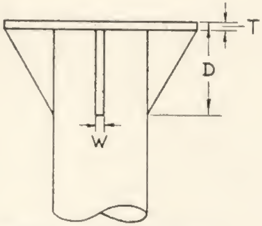
Outside Diam. of Col.	Distance "D"
3½″	3¼″
4″	3½″
4½″	3¾″
5″	4″
5½″	4¼″
6⅝″	4¾″
7⅝″	5″
8⅝″	5¾″
9⅝″	6¼″
10¾″	7″
12¾″	8″

Distance "D" is the same for 1-way and 2-way Steel Cap Fasteners.

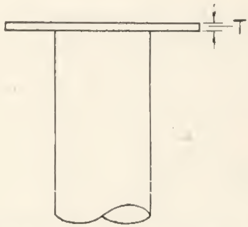
Caps are fabricated to your order, of any dimensions or shape and with additional brackets to meet conditions. Caps are for use with steel, wood or concrete beams and are, in most cases, the width of the beams that they carry unless the beam is narrower than the column, in which case the caps are as wide as the column. Caps are long enough to give sufficient bearing to the beam carried. Distance "G" must be given when ordering. Distance "D" is given for your convenience only and may be changed to meet special conditions.

Steel Fastened Bases.

Bases that rest on steel beams are similar to our fastened caps inverted, so in ordering follow the same instructions that are given for caps, and in addition, furnish us with a sketch showing the relationship between caps and bases, that is, whether the beams carried by the cap and the beams under the base run in the same direction.



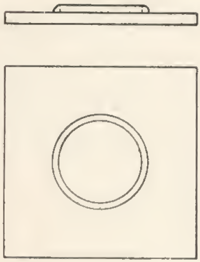
STEEL BRACKET CAP



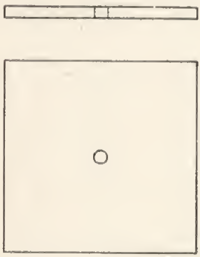
STEEL FASTENED CAP

Diam. of Col.	Dimensions		
	D	T	W
3½	6½″	½″	⅜″
4	6½″	½″	⅜″
4½	6½″	½″	⅜″
5	6⅝″	⅝″	⅜″
5½	6⅝″	⅝″	½″
6⅝	6¾″	¾″	⅝″
7⅝	6¾″	¾″	⅝″
8⅝	6¾″	¾″	⅝″
9⅝	6¾″	¾″	⅝″
10¾	6¾″	¾″	⅝″
12¾	6¾″	¾″	⅝″

Dimensions of Brackets and Thickness of Caps.



Diam. of Col.	Size of Base	Thickness 500 lbs. sq. in.	Max. Load in lbs.
ins.	ins.	ins.	
3½	8 × 8	⅝	32000
4	9 × 9	¾	41000
4½	10 × 10	⅞	50000
5	12 × 12	1	72000
5½	14 × 14	1¼	98000



Diam. of Col.	Size of Base	Thickness 500 lbs. sq. in.	Max. Load in lbs.
ins.	ins.	ins.	
6⅝	16 × 16	1⅜	128000
7⅝	18 × 18	1⅝	162000
8⅝	20 × 20	1¾	200000
9⅝	22 × 22	1⅞	242000
10¾	24 × 24	2	288000
12¾	28 × 28	2¼	392000

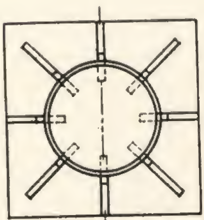
Thickness, Size and Maximum Loads of Unstiffened Steel Base Plates for Lally Columns.

"Fastened" steel bases can be furnished; see "Steel caps fastened," Page 44.

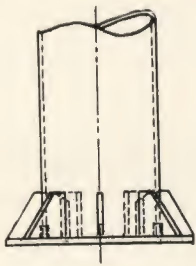
"Stiffened" steel bases can be furnished; see Page 47.

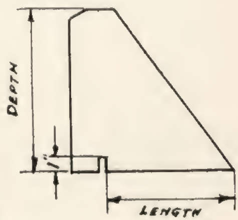
Dimensions of Stiffened Steel Base Plates for Lally Columns With Structural Plate Brackets

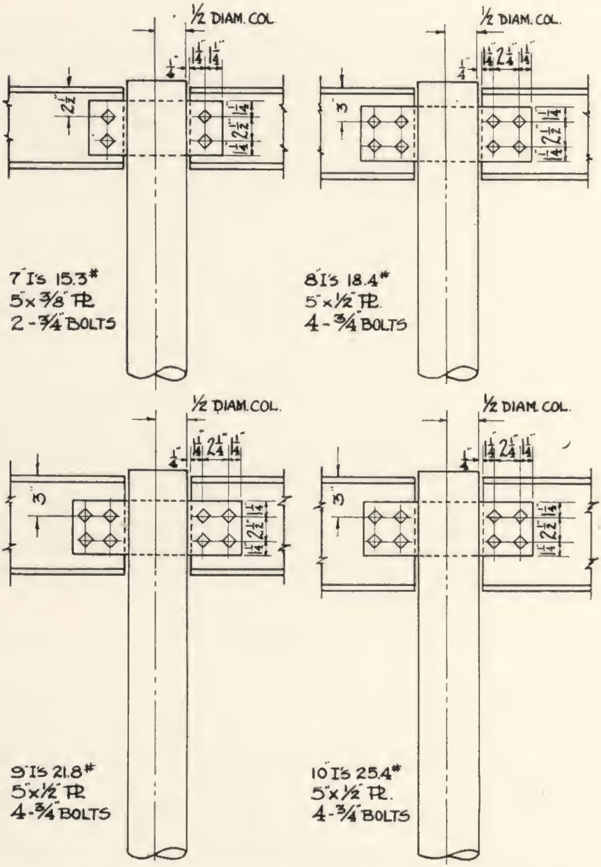
Dia. of Col. Ins.	Size of Base Plate Ins.	Safe Load Based on Footing Pressure 500 Lbs. Sq. In.	Number of Standard Brackets	Size of Brackets		
				Length Ins.	Depth Ins.	Thickness Ins.
3½	8x8 x½	32000	4	3	6	½
4	9x9 x½	41000	4	3½	6	½
4½	10x10x½	50000	4	4	6	½
5	12x12x½	72000	4	4	6	⅝
5½	14x14x¾	98000	4	4	6	¾
6⅝	16x16x¾	128000	8	4	6	⅝
7⅝	18x18x¾	162000	8	4-4 4-6	6	⅝
8⅝	20x20x¾	200000	8	4-5 4-9	6	¾
9⅝	22x22x¾	242000	8	4-5 4-9	6	¾
10¾	24x24x⅞	288000	8	4-5 4-9	6	⅞
12¾	28x28x⅞	392000	8	4-6 4-10	6	⅞



BASE WITH 8 RIBS BRACKETS USED AS RIBS

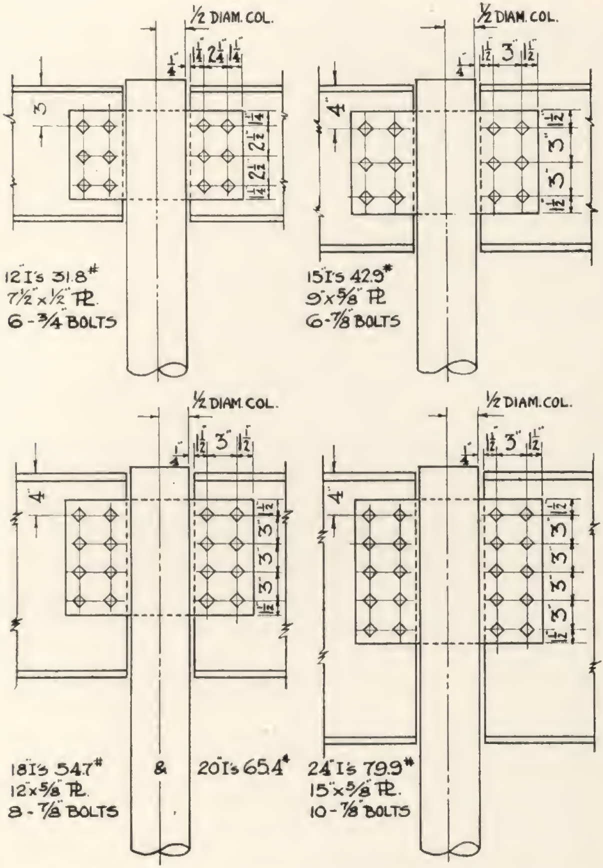






Through Web Plate Connections for Standard "I" Beams.

Plates Electrically Welded.



Through Web Plate Connections for Standard "I" Beams.

Plates Electrically Welded.

Wood Joists

Safe Uniform Load in Pounds per Sq. Foot for L.L.Y.P. Wood Joists, Including Weight of Joists, as per New York Building Code, 1915

FOR L. L. Y. P.— MAX. STRESS IN BENDING = 1600 LBS. PER SQ. IN.
MAX. LONGITUDINAL SHEAR = 150 " " " "

Safe Distributed Loads in Lbs. per Sq. Ft. for Beams 16" O. C.							Total Load in Tons for Beams One Inch Thick Loads Uniformly Distributed										
Span in Ft.	Size of Beams						Span in Ft.	Depth of Beams									
	3"x6"	3"x8"	3"x9"	3"x10"	3"x12"	3"x14"		6"	7"	8"	9"	10"	11"	12"	14"	15"	16"
8	225	400	506	562	675	788	8	.40	.54	.71	.90	1.00	....	....	....	....	....
9	178	316	400	494	600	700	9	.36	.48	.63	.80	.99	1.10	....	....	....	....
10	144	256	324	400	540	630	10	.32	.43	.57	.72	.89	1.08	1.20	....	....	....
11	119	212	268	331	476	573	11	.29	.40	.52	.65	.81	.98	1.16	....	....	....
12	100	178	225	278	400	525	12	.27	.36	.47	.60	.74	.90	1.07	1.40	....	....
13	85	152	192	237	341	464	13	.25	.33	.44	.55	.68	.83	.98	1.34	1.50	....
14	73	131	165	204	294	400	14	.23	.31	.41	.51	.63	.77	.91	1.24	1.43	1.60
15	64	114	144	178	256	348	15	.21	.29	.38	.48	.59	.72	.85	1.16	1.33	1.52
16	56	100	127	156	225	306	16	.20	.27	.36	.45	.56	.67	.80	1.09	1.25	1.42
17	50	89	112	138	199	271	17	.19	.25	.34	.42	.52	.63	.75	1.02	1.18	1.34
18	44	79	100	123	178	242	18	.18	.24	.32	.40	.49	.60	.71	.97	1.11	1.26
19	40	71	90	111	159	217	19	.17	.23	.30	.38	.47	.57	.67	.92	1.05	1.20
20	36	64	81	100	144	196	20	.16	.22	.28	.36	.44	.54	.64	.87	1.00	1.14
21	33	58	73	91	131	178	21	.15	.21	.27	.34	.42	.51	.61	.83	.95	1.08
22	30	53	67	83	119	162	22	.14	.20	.26	.33	.40	.49	.58	.79	.91	1.03
23	27	48	61	76	109	148	23	.14	.20	.25	.31	.39	.47	.56	.76	.87	.99
24	25	44	56	69	100	136	24	.13	.18	.24	.30	.37	.45	.53	.73	.83	.95
25	23	41	52	64	92	125	25	.13	.17	.23	.29	.36	.43	.51	.70	.80	.91
26	21	38	48	59	85	116	26	.12	.17	.22	.28	.34	.41	.49	.67	.77	.88

NOTE.— Loads above and to the right of the zig-zag lines are determined by longitudinal shear. Loads below and to the left of the zig-zag lines are determined by the extreme fibre stress in bending. For Joists 12 ins. O. C., add one-third; for Joists 20 ins. O. C., deduct one-fifth.

Wood Joists

Safe Uniform Load in Lbs. per Sq. Ft. for Spruce and Douglas Fir Wood Joists, Including Weight of Joists, as per New York Building Code, 1915

For Spruce and Douglas Fir — Max. Stress in Bending = 1200 Lbs. per Sq. In.
— Max. Longitudinal Shear = 100 " " " "

Safe Distributed Load in Lbs. per Sq. Ft. for Beams 16" O. C.							Total Load in Tons for Beams One Inch Thick Loads Uniformly Distributed										
Span in Ft.	Size of Beams						Span in Ft.	Depth of Beams									
	3"x6"	3"x8"	3"x9"	3"x10"	3"x12"	3"x14"		6"	7"	8"	9"	10"	11"	12"	14"	15"	16"
8	169	300	338	376	450	524	8	.30	.41	.53	....	....	....	....	....	....	....
9	133	238	300	333	400	465	9	.27	.36	.47	.60	....	....	....	....	....	....
10	108	192	243	300	360	419	10	.24	.33	.43	.54	.67	....	....	....	....	....
11	89	159	201	248	327	380	11	.22	.30	.39	.49	.61	.73	....	....	....	....
12	75	134	169	208	300	348	12	.20	.27	.36	.45	.56	.67	.80	....	....	....
13	64	114	144	178	256	322	13	.18	.25	.33	.42	.51	.62	.74	....	....	....
14	55	98	124	153	220	300	14	.17	.23	.30	.39	.48	.58	.69	.93	....	....
15	48	85	108	133	192	261	15	.16	.22	.28	.36	.44	.54	.64	.87	1.00	....
16	42	75	95	117	169	230	16	.15	.20	.27	.34	.42	.50	.60	.82	.94	1.07
17	37	66	84	104	149	203	17	.14	.19	.25	.32	.39	.47	.56	.77	.89	1.00
18	33	59	75	93	133	181	18	.13	.18	.24	.30	.37	.45	.53	.73	.83	.95
19	30	53	67	83	120	163	19	.13	.17	.22	.28	.35	.42	.50	.69	.79	.90
20	27	48	61	75	108	147	20	.12	.16	.21	.27	.33	.40	.48	.65	.75	.85
21	24	44	55	68	98	133	21	.11	.16	.20	.26	.32	.38	.46	.62	.72	.81
22	22	40	50	62	89	121	22	.11	.15	.19	.25	.30	.37	.44	.59	.68	.78
23	20	36	46	57	82	111	23	.10	.14	.19	.23	.29	.35	.42	.57	.65	.74
24	19	33	42	52	75	102	24	.10	.14	.18	.22	.28	.34	.40	.54	.62	.71
25	17	31	39	48	69	94	25	.10	.13	.17	.22	.27	.32	.38	.52	.60	.68
26	16	28	36	44	64	87	26	.09	.13	.16	.21	.26	.31	.37	.50	.58	.66

Note.— Loads above and to the right of the zig-zag lines are determined by longitudinal shear. Loads below and to the left of the zig-zag lines are determined by the extreme fibre stress in bending.
For Joists 12 ins. O. C., add one-third; for Joists 20 ins. O. C., deduct one-fifth.

Wood Girders
Safe Uniform Load in Pounds per Lineal Foot Including Weight of Beam For Beams One Inch Thick as per New York Building Code, 1915

Material	Depth in Inches	SPAN IN FEET																		
		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Long Leaf Yellow Pine 1600 Lbs. per Sq. In. (Hemlock 800 Lbs. per Sq. In. Take Half Value)	6	100	79	64	53	44	38	33	28	25	22	20	18	16	15	13	12	11	10	9
	7	136	107	87	72	61	52	44	39	34	30	27	24	22	20	18	17	15	14	13
	8	178	140	114	94	79	67	58	51	44	39	38	32	28	26	24	22	20	18	17
	9	225	178	144	119	100	85	73	64	56	50	44	40	36	33	30	27	25	23	21
	10	250	219	178	147	123	105	91	79	69	62	55	49	44	40	37	34	31	28	26
	12	300	267	240	216	178	151	130	114	100	89	79	71	64	59	52	48	44	41	38
	14	350	311	280	255	233	206	178	156	136	120	107	96	87	79	72	67	61	56	52
	16	400	356	320	291	267	246	229	202	178	157	140	126	114	103	94	86	79	73	67
Spruce Douglas Fir White Pine Oak 1200 Lbs. per Sq. In.	6	75	59	48	40	33	28	24	21	19	17	15	13	12	11	10	9	8	8	7
	7	102	81	65	54	45	39	33	29	26	23	20	18	16	15	14	12	11	10	10
	8	133	105	85	71	59	50	44	38	33	30	26	24	21	19	18	16	15	14	13
	9	150	133	108	89	75	64	55	48	42	37	33	30	27	24	22	20	19	17	16
	10	167	148	133	110	93	79	68	59	52	46	41	37	33	30	28	25	23	21	20
	12	200	178	160	145	133	114	98	85	75	66	59	53	48	44	40	36	33	31	28
	14	233	207	187	170	156	143	133	116	102	90	81	72	65	59	54	49	45	42	39
	16	267	237	213	194	178	164	152	142	133	118	105	94	85	77	71	65	59	55	51
Short Leaf Yellow Pine 1000 Lbs. per Sq. In.	6	63	49	40	33	28	24	20	18	16	14	12	11	10	9	8	8	7	6	6
	7	85	67	54	45	38	32	28	24	21	19	17	15	14	12	11	10	9	9	8
	8	111	88	71	59	49	42	36	32	28	25	22	20	18	16	15	13	12	11	11
	9	141	111	90	74	63	53	46	40	35	31	28	25	23	20	19	17	16	14	13
	10	167	137	111	92	77	66	57	49	43	38	34	31	28	25	23	21	19	18	16
	12	200	178	160	132	111	95	82	71	62	55	49	44	40	36	33	30	28	26	24
	14	233	207	187	170	151	129	111	97	85	75	67	60	54	49	45	41	38	35	32
	16	267	237	213	194	178	164	145	126	111	98	88	79	71	65	59	54	49	45	42

NOTE.—Loads below and to the left of zig-zag lines are determined by longitudinal shear.

Safe Uniform Load in Pounds per Lineal Foot, Including Weight of Beam For Reinforced Concrete Beams

As per New York Building Code, 1915

Rectangular Beams   Simple Span

Dimensions		Round Bars				Span of Beam in Feet															
Depth	Width	Straight		Bent		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Ins.	Ins.	No	Size	No.	Size	Safe Load in Pounds per Lineal Foot Uniformly Distributed, Including Weight of Beam															
12	6	1	5/8	1	1/2	1273	936	717	567	459	380	318	271	234	204	179					
	8	1	5/8	1	5/8	1625	1193	912	721	583	483	406	346	298	260	228	202				
	10	2	1/2	2	1/2	2083	1532	1174	927	750	620	521	444	383	334	293	260	232			
14	8	1	3/4	1	5/8	2358	1735	1327	1047	849	701	590	502	433	377	331	294	262	235	212	
	10	2	5/8	1	5/8	2918	2142	1640	1296	1048	868	729	621	535	466	410	363	324	291	262	238
	12	2	5/8	2	5/8	3657	2683	2055	1624	1315	1087	913	779	671	585	513	455	406	364	329	298
16	8	1	3/4	1	3/4	3200	2350	1800	1421	1149	951	799	680	587	511	450	398	355	319	288	261
	10	1	7/8	1	3/4	3818	2807	2150	1700	1375	1135	955	814	701	610	538	475	424	380	344	311
	12	2	3/4	1	3/4	4795	3525	2695	2130	1724	1425	1197	1020	880	766	672	596	531	477	430	390
18	8	1	7/8	1	3/4	4200	3087	2362	1870	1513	1250	1050	895	771	672	591	523	467	419	378	343
	10	2	5/8	2	5/8	5150	3785	2897	2290	1855	1533	1288	1098	946	825	725	642	573	514	464	421
	12	2	3/4	1	7/8	6200	4550	3482	2752	2232	1842	1550	1320	1139	992	872	772	688	618	558	505
	14	2	3/4	2	3/4	7287	5354	4100	3237	2623	2167	1825	1555	1341	1169	1027	910	812	728	657	596
20	8	1	7/8	1	3/4	4900	3600	2758	2180	1765	1460	1225	1045	901	785	690	611	545	489	442	400
	10	2	3/4	1	3/4	6230	4585	3513	2775	2243	1858	1560	1330	1145	1000	878	778	694	622	562	510
	12	2	3/4	2	3/4	7990	5873	4492	3550	2878	2375	1998	1702	1468	1279	1123	995	888	796	719	652
	14	2	7/8	2	3/4	9350	6860	5255	4155	3364	2780	2337	1992	1718	1496	1315	1165	1040	932	841	763

NOTE.— Loads below and to the left of the heavy line require additional shear reinforcement.

Safe Uniform Load in Pounds per Lineal Foot, Including Weight of Beam For Reinforced Concrete Beams

As per New York Building Code, 1915

Rectangular Beams   Simple Span

Depth Ins.	Width Ins.	Straight No.	Straight Size	Bent No.	Bent Size	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
						Safe Load in Pounds per Lineal Foot Uniformly Distributed, Including Weight of Beam															
22	8	1	7/8	1	7/8	2252	1860	1563	1332	1150	1000	880	779	695	624	563	511	465	426	391	361
	10	1	1	1	1	2885	2385	2003	1708	1472	1282	1128	998	890	799	721	655	596	545	501	462
	12	2	3/4	2	3/4	3324	2747	2310	1968	1698	1479	1300	1150	1027	921	831	754	687	629	577	532
	14	2	7/8	2	3/4	3912	3233	2715	2315	1995	1738	1528	1352	1207	1082	977	886	808	739	679	626
24	8	1	1	1	7/8	2800	2314	1945	1657	1430	1245	1095	969	864	775	700	635	578	530	486	448
	10	2	3/4	2	3/4	3551	2935	2464	2100	1812	1578	1388	1229	1097	983	887	805	734	671	616	568
	12	2	7/8	1	1	4080	3375	2833	2415	2082	1813	1595	1412	1260	1130	1020	925	844	772	709	653
	14	2	7/8	2	7/8	4902	4050	3405	2900	2502	2180	1915	1697	1513	1359	1227	1112	1013	926	851	785
26	8	1	1	1	1	3373	2787	2342	1996	1720	1500	1318	1167	1040	935	843	765	697	638	585	540
	10	2	7/8	1	7/8	4049	3345	2810	2395	2064	1800	1580	1400	1250	1121	1011	918	836	765	702	647
	12	2	7/8	2	7/8	5114	4230	3550	3025	2610	2274	1996	1770	1580	1417	1280	1160	1057	966	888	818
	14	2	1	2	7/8	5934	4900	4118	3510	3025	2635	2317	2053	1830	1642	1482	1345	1225	1121	1030	949
28	8	1	1	1	1	3807	3145	2643	2255	1944	1692	1488	1318	1176	1055	952	864	787	720	661	610
	10	2	7/8	1	1	4820	3985	3350	2853	2460	2142	1884	1670	1489	1335	1205	1093	996	911	837	771
	12	2	7/8	2	7/8	5847	4830	4060	3460	2980	2600	2283	2022	1805	1620	1461	1325	1208	1105	1015	935
	14	2	1	2	7/8	6722	5555	4668	3978	3430	2990	2627	2325	2077	1862	1681	1525	1390	1271	1168	1077
30	8	2	1	1	7/8	5646	4660	3918	3340	2880	2508	2203	1952	1740	1562	1410	1280	1167	1068	980	903
	10	2	1	1	1 1/8	6705	5545	4658	3970	3425	2980	2620	2320	2070	1860	1678	1521	1387	1268	1165	1073
	12	2	1	2	1	7976	6593	5540	4720	4065	3545	3115	2760	2460	2210	1995	1810	1648	1508	1385	1277
	14	3	7/8	2	1	8825	7300	6130	5220	4500	3925	3450	3055	2725	2445	2205	2000	1825	1670	1532	1412

SAFE UNIFORM LOAD IN POUNDS PER LINEAL FOOT, INCLUDING WEIGHT OF BEAM FOR REINFORCED CONCRETE BEAMS

As per New York Building Code, 1915

RECTANGULAR BEAMS CONTINUOUS SPAN

Dimensions		Round Bars				Span of Beam in Feet															
Depth	Width	Straight		Bent		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Ins.	Ins.	No.	Size	No.	Size	Safe Load in Pounds per Lineal Foot Uniformly Distributed, Including Weight of Beam															
12	6	1	½	1	½	1576	1159	887	700	568	469	394	336	290	252	222					
	8	1	⅝	1	⅝	2432	1787	1369	1080	875	724	608	518	447	389	342	303	270	242	219	
	10	2	½	2	½	3122	2293	1760	1389	1125	930	781	666	574	500	440	389	347	312	281	255
14	8	1	⅝	1	⅝	2935	2155	1650	1305	1056	873	734	625	539	470	413	366	326	292	264	240
	10	1	¾	1	¾	4160	3060	2342	1851	1500	1240	1040	886	765	666	585	519	463	415	375	340
	12	2	⅝	2	⅝	5480	4027	3083	2440	1973	1631	1371	1169	1008	877	771	683	610	546	493	448
16	8	1	¾	1	¾	4790	3520	2693	2128	1724	1425	1195	1020	880	766	674	596	532	478	431	391
	10	1	⅞	1	⅞	6115	4500	3444	2720	2203	1822	1530	1305	1125	980	861	762	680	611	551	500
	12	2	⅝	2	⅝	6785	4985	3817	3015	2442	2020	1697	1446	1247	1086	955	845	754	676	610	554
18	8	1	¾	1	¾	5567	4090	3133	2475	2005	1658	1391	1187	1022	891	783	694	619	555	501	455
	10	2	⅝	2	⅝	7730	5675	4350	3438	2783	2300	1932	1647	1420	1237	1088	963	859	771	696	631
	12	2	⅝	2	⅝	7800	5730	4390	3467	2808	2322	1950	1662	1433	1249	1098	972	866	778	702	637
	14	2	¾	2	¾	10920	8027	6150	4855	3935	3250	2732	2328	2007	1750	1537	1361	1215	1090	984	892
20	8	1	⅞	1	⅞	8005	5885	4507	3560	2881	2381	2003	1708	1472	1282	1127	998	890	799	721	654
	10	2	⅝	2	⅝	8735	6420	4914	3883	3146	2600	2184	1862	1605	1398	1229	1089	972	871	786	714
	12	2	¾	2	¾	12000	8810	6750	5335	4317	3570	3000	2558	2205	1920	1689	1495	1335	1198	1080	980
	14	2	¾	2	¾	12520	9200	7045	5560	4503	3722	3130	2665	2300	2004	1761	1560	1391	1249	1127	1022

NOTE.— Loads below and to the left of the heavy line require additional shear reinforcement.

SAFE UNIFORM LOAD IN POUNDS PER LINEAL FOOT, INCLUDING WEIGHT OF BEAM FOR REINFORCED CONCRETE BEAMS

As per New York Building Code, 1915

RECTANGULAR BEAMS CONTINUOUS SPAN

DIMENSIONS		ROUND BARS				SPAN OF BEAM IN FEET															
Depth	Width	Straight		Bent		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Ins.	Ins.	No.	Size	No.	Size	Safe Load in Pounds per Lineal Foot Uniformly Distributed. Including Weight of Beam															
22	8	2	⅝	2	⅝	3466	2865	2407	2050	1770	1540	1355	1200	1070	960	866	786	716	655	602	555
	10	1	1	1	1	4328	3575	3005	2560	2208	1923	1690	1498	1336	1200	1082	981	894	818	751	692
	12	2	¾	2	¾	4986	4118	3460	2950	2542	2215	1946	1724	1538	1380	1246	1130	1030	942	865	797
	14	2	⅞	2	⅞	6277	5190	4357	3714	3203	2790	2453	2172	1939	1739	1570	1423	1297	1188	1090	1004
24	8	1	⅞	1	⅞	3730	3085	2591	2208	1903	1658	1457	1291	1151	1033	933	845	770	705	648	597
	10	2	¾	2	¾	5326	4405	3700	3153	2720	2365	2080	1843	1644	1475	1331	1208	1100	1008	925	852
	12	2	¾	2	¾	5510	4560	3827	3262	2812	2450	2153	1908	1700	1527	1378	1250	1139	1042	958	882
	14	2	⅞	2	⅞	7353	6080	5105	4350	3750	3270	2873	2544	2269	2040	1840	1669	1520	1390	1278	1178
26	8	1	1	1	1	5060	4180	3517	2997	2582	2250	1978	1751	1562	1402	1265	1149	1047	956	879	810
	10	2	¾	2	¾	5972	4938	4150	3535	3047	2655	2333	2066	1842	1655	1493	1355	1233	1129	1038	955
	12	2	⅞	2	⅞	7671	6343	5327	4540	3914	3410	3000	2655	2367	2124	1918	1740	1586	1450	1332	1228
	14	2	⅞	2	⅞	8114	6708	5640	4805	4145	3608	3170	2810	2505	2248	2030	1841	1679	1535	1410	1300
28	8	1	1	1	1	5711	4725	3965	3380	2915	2540	2232	1977	1764	1582	1429	1296	1180	1080	991	915
	10	2	¾	2	¾	6504	5380	4518	3850	3320	2890	2540	2250	2010	1802	1627	1476	1344	1230	1130	1041
	12	2	⅞	2	⅞	8770	7250	6095	5195	4475	3900	3425	3035	2710	2430	2192	1990	1813	1659	1524	1405
	16	2	1	2	1	11422	9440	7940	6760	5827	5077	4460	3955	3525	3164	2858	2590	2362	2160	1983	1828
30	10	2	¾	2	¾	7032	5808	4880	4160	3587	3121	2747	2433	2170	1948	1758	1595	1452	1329	1220	1124
	12	2	⅞	2	⅞	9469	7825	6570	5605	4833	4210	3700	3278	2920	2623	2365	2148	1958	1791	1645	1516
	14	2	1	2	1	11964	9885	8310	7080	6100	5317	4675	4140	3690	3310	2990	2710	2470	2260	2075	1912
	18	3	⅞	3	⅞	14189	11720	9850	8395	7240	6310	5540	4907	4375	3928	3545	3215	2930	2680	2460	2270

NOTE.— Loads below and to the left of the heavy line require additional shear reinforcement.

RIVET AND BOLT VALUES

New York Building Code, 1915

SHOP OR POWER DRIVEN RIVETS, SHEAR AT 12000 LBS. SQ. IN., BEARING AT 24000 LBS. SQ. IN.

Diam. of Rivet		Area	Single	Double	Bearing Values for Different Thicknesses of Plate												
Frac.	Dec.	Sq. Ins.	Shear	Shear	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	1330	2650	2250	2810											
1/2	.500	.1963	2360	4710	3000	3750	4500	5250									
5/8	.625	.3068	3680	7360	3750	4690	5620	6560	7500								
3/4	.750	.4418	5300	10600	4500	5620	6750	7880	9000	10120	11250						
7/8	.875	.6013	7220	14430	5250	6560	7880	9190	10500	11810	13120	14440					
1	1.000	.7854	9420	18850	6000	7500	9000	10500	12000	13500	15000	16500	18000	19500			
1 1/8	1.125	.9940	11930	23860	6750	8440	10120	11810	13500	15190	16880	18560	20250	21940	23620	25310	

HAND DRIVEN FIELD RIVETS, SHEAR AT 8000 LBS. SQ. IN., BEARING AT 16000 LBS. SQ. IN

Diam. of Rivet		Area	Single	Double	Bearing Values for Different Thicknesses of Plate												
Frac.	Dec.	Sq. Ins.	Shear	Shear	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	880	1770	1500	1880											
1/2	.500	.1963	1570	3140	2000	2500	3000	3500									
5/8	.625	.3068	2450	4910	2500	3120	3750	4380	5000								
3/4	.750	.4418	3530	7070	3000	3750	4500	5250	6000	6750	7500						
7/8	.875	.6013	4810	9620	3500	4380	5250	6120	7000	7880	8750	9620					
1	1.000	.7854	6280	12570	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000			
1 1/8	1.125	.9940	7950	15900	4500	5620	6750	7880	9000	10120	11250	12380	13500	14620	15750	16880	

FIELD BOLTS, SHEAR AT 7000 LBS. SQ. IN., BEARING AT 12000 LBS. SQ. IN.

Diam. of Rivet		Area	Single	Double	Bearing Values for Different Thicknesses of Plate												
Frac.	Dec.	Sq. Ins.	Shear	Shear	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	770	1550	1120	1410	1690										
1/2	.500	.1963	1370	2750	1500	1880	2250	2620	3000								
5/8	.625	.3068	2150	4300	1880	2340	2810	3280	3750	4220	4690						
3/4	.750	.4418	3090	6190	2250	2810	3380	3940	4500	5060	5620	6190					
7/8	.875	.6013	4210	8420	2620	3280	3940	4590	5250	5910	6560	7220	7880	8530			
1	1.000	.7854	5500	11000	3000	3750	4500	5250	6000	6750	7500	8250	9000	9750	10500	11250	
1 1/8	1.125	.9940	6960	13920	3380	4220	5060	5910	6750	7590	8440	9280	10120	10970	11810	12660	13500

IN THE following pages are shown photographic reproductions of Buildings of various types equipped with Lally Columns.

We especially call your attention to the remarkable fire-resisting qualities of Lally Columns, as shown on pages 72 to 77 inclusive, by actual photographs of columns that have stood apparently unharmed through some of the greatest fires of recent years.

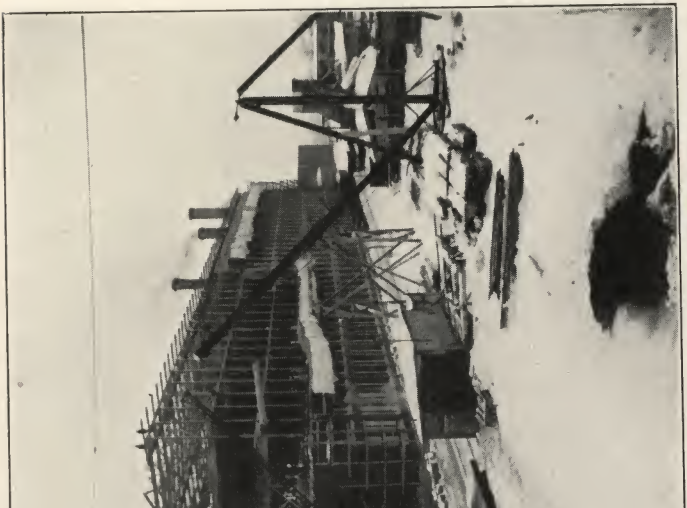
This picture shows one of the six floors of the new Kerr Mill, Fall River, Mass., for the American Thread Co., equipped with Lally Columns, continuous from basement to roof.

Exterior View of Kerr Mill, Fall River, Mass.

The Lally Columns and connections are used extensively in mill construction. Some of the largest mills in the country are supported by Lally Columns.

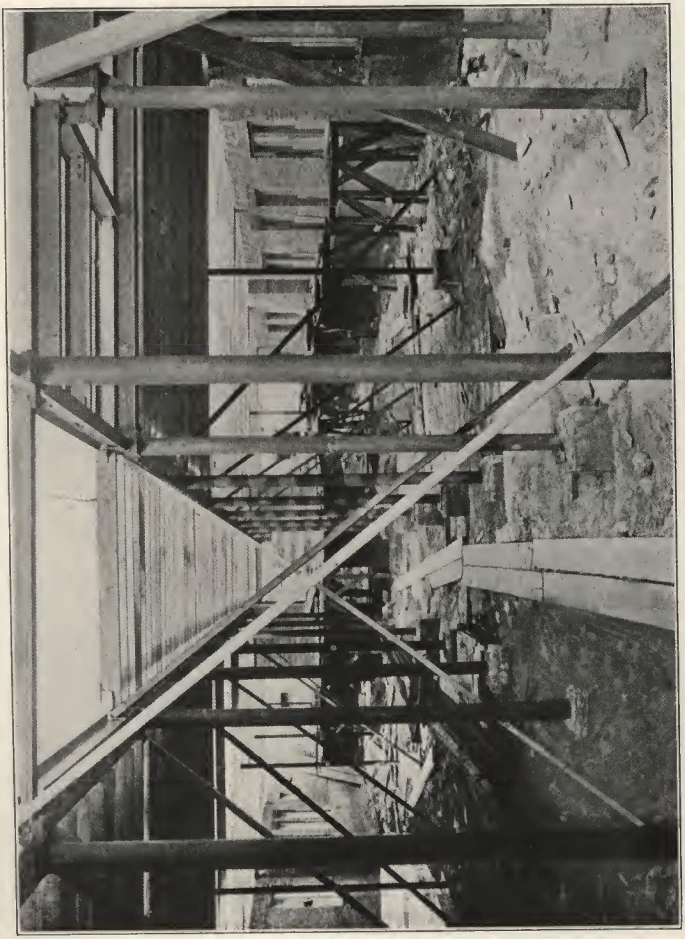
Holmes Manufacturing Co. Mill, New Bedford, Mass.
Showing Lally Columns in Basement

Holmes Manufacturing Co. Mill, New Bedford, Mass.
Lally Columns used throughout
Charles W. Praray, Eng.



Farr Alpaca Mill No. 4, Holyoke, Mass., in process of construction.
572 Lally Columns were used.
Samuel M. Green Co., Architects, Springfield, Mass.

Farr Alpaca Mill No. 4 completed, Holyoke, Mass.
Samuel M. Green Co., Architects, Springfield, Mass.



Interior View of a Portion of the Ground Floor of an Apartment Project.
539 Lally Columns Used.

12¾ Inch Diameter Lally Columns in Building of Illinois Shade Cloth Co., Chicago Heights, Ill. Bracket Caps Provide for Columns in Floor Above.

Lally Columns in Salisbury Mfg. Co., Central Falls, R. I.
Alonzo B. Reed, Engr.

Interior View of Apartment Building at 4933–35 Lake Park Ave., Chicago.
93 Lally Columns Used.

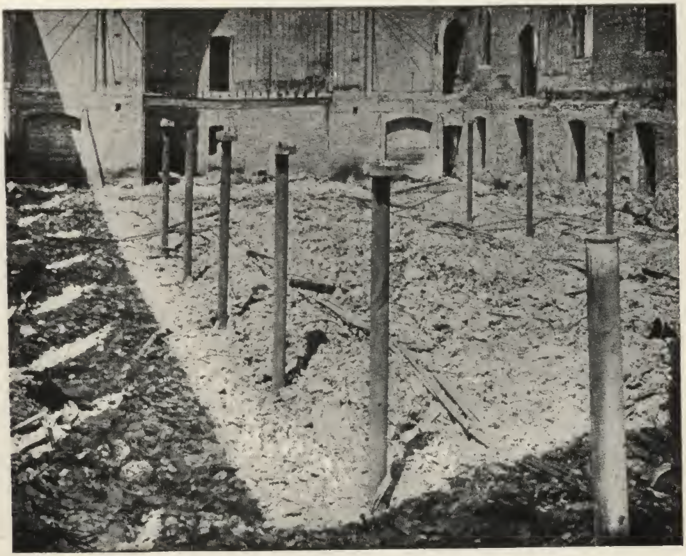
Lally Columns furnished in building for Chicago Flexible Shaft Co.

S. M. Crowen, Architect.

Borden Mills, Inc. 1924 Kingsport, Tenn.

Borden Mills, Inc. 1924 Kingsport, Tenn.

St. Rose Catholic Church, Chelsea, Mass.
Lally Columns used before and after the fire.

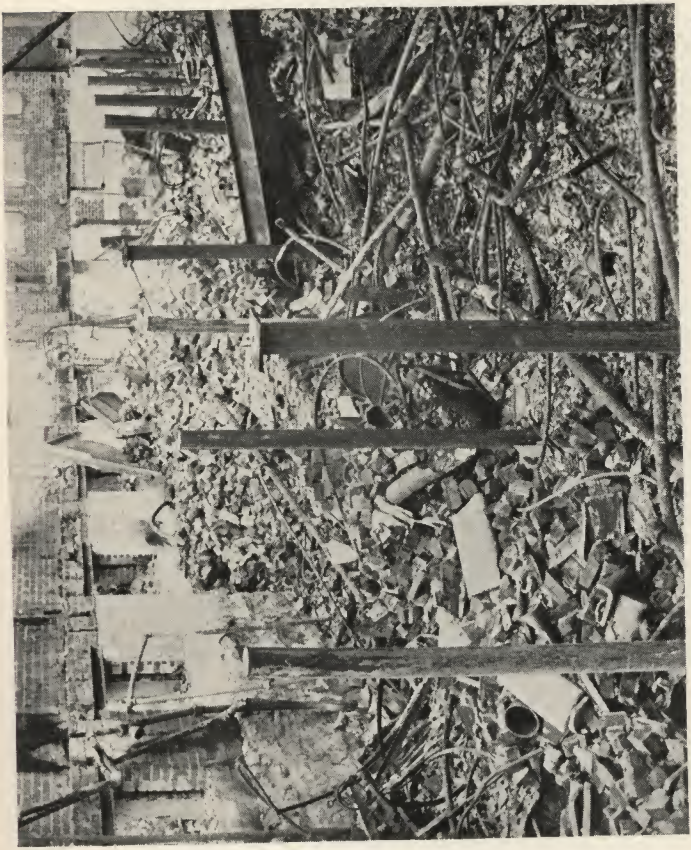


Ruins of St. Rose Catholic Church in Chelsea, Mass.

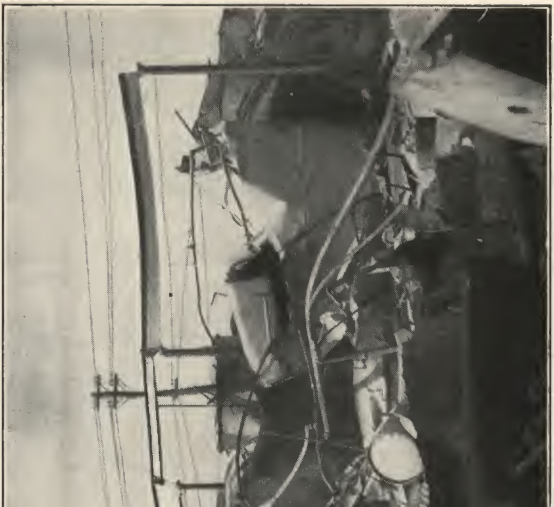
Showing Lally Columns standing as firm as before the fire. This photograph was taken the morning after the fire.

There can be no doubt of the supremacy of the Lally Columns after these wonderful tests for fire resistance.

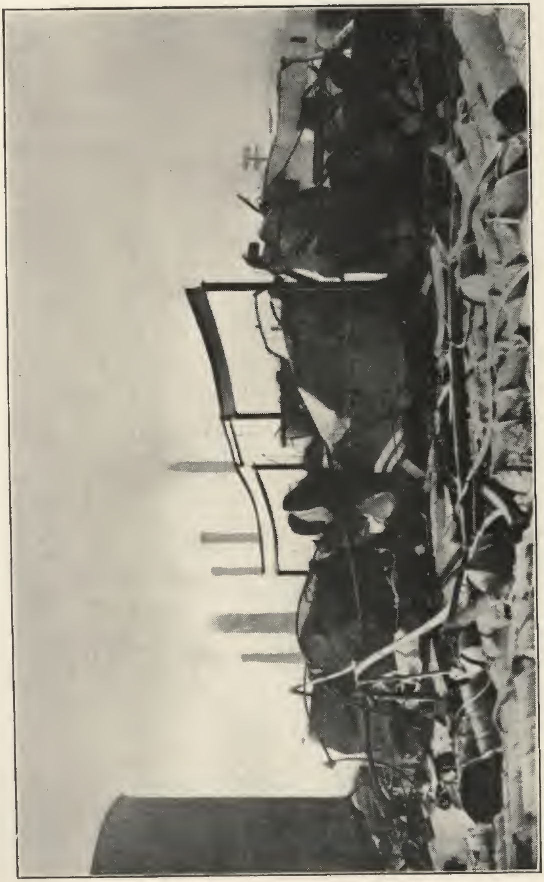
Church ruin, showing a lot of cast-iron columns broken in several pieces after fire.



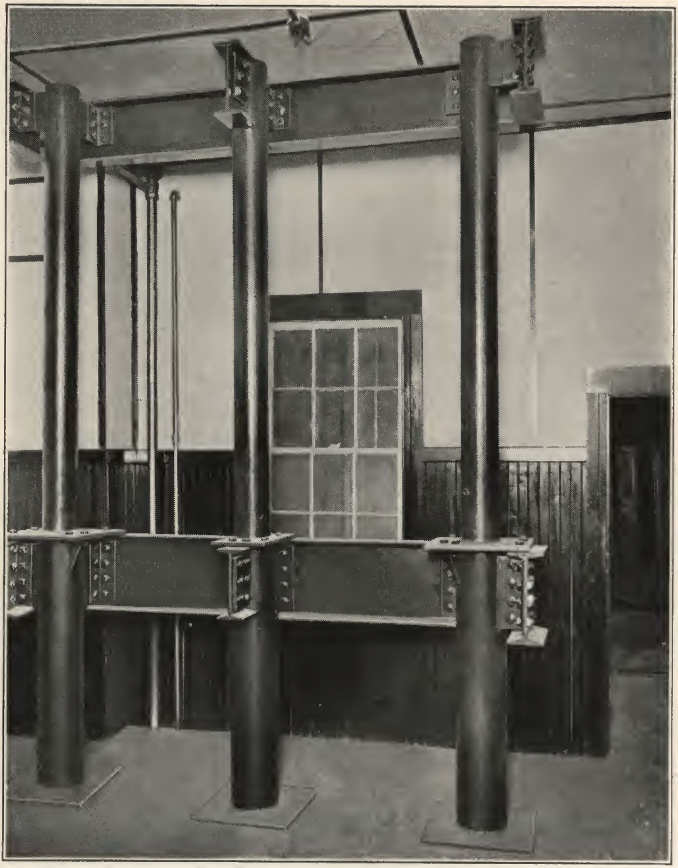
View of the French Parochial School ruins adjoining the church, showing the condition of the Lally Columns after the fire at Salem, Mass.



Fire in the Standard Oil Company's plant, Greenpoint, N. Y., Sept. 13, 14, 15, 1919, Showing Lally Columns unharmed after the fire.



Showing the Lally Columns after the terrible fire that destroyed the Standard Oil Company's plant at Brooklyn, N. Y.



Model of the new Lally Column with web plates used in Multi-story Construction in Fireproof Buildings.
Further information on request.

Lally Columns with through web plate connections used in Quincy Police Station, Quincy, Mass.

Commonwealth Garage, Quincy, Mass.
Lally Columns used throughout.

PATENTS

The various important details and improvements in LALLY COLUMN CONSTRUCTION are covered by patents. The Lally Column Companies own and control the exclusive rights to manufacture these patented articles. All others are warned against infringements, and any owner, contractor or builder violating these patents will be held to strict accountability and will be subject to suit therefor.

LIST OF PATENTS

No. 843,218, dated Feb. 5, 1907
No. 853,702, dated May 14, 1907
No. 869,789, dated Oct. 29, 1907
No. 869,869, dated Oct. 29, 1907
No. 901,453, dated Oct. 20, 1908
No. 905,888, dated Dec. 8, 1908
No. 1,071,523, dated Aug. 26, 1913
No. 1,185,207, dated May 13, 1916
No. 1,230,584, dated June 19, 1917
No. 1,258,917, dated Mar. 12, 1918
No. 1,261,407, dated April 2, 1918
No. 1,329,614, dated Feb. 3, 1920
No. 1,418,581, dated June 6, 1922
No. 1,432,192, dated Oct. 17, 1922
No. 1,440,545, dated Jan. 2, 1923
No. 1,472,600, dated Oct. 30, 1923
No. 1,472,602, dated Oct. 30, 1923
No. 1,472,603, dated Oct. 30, 1923
No. 1,527,314, dated Feb. 24, 1925
No. 1,537,833, dated May 12, 1925
No. 1,537,835, dated May 12, 1925
No. 1,539,580, dated May 26, 1925
No. 1,539,581, dated May 26, 1925
No. 1,547,175, dated July 28, 1925
No. 1,548,046, dated Aug. 4, 1925

No concrete-filled pipe columns and connections are genuine "LALLY" unless so brand-marked. Do not be deceived by imitations.

List of Installations

Building for Middlesex Bleachery, Somerville, Mass.
Building for Central Railway Signal Co., Newton, Mass.
Building for University Prints, Newton Corners, Mass.
Factory for Greylock Candy Co., Cambridge, Mass.
Mercantile Building for Dr. John G. Niles, Somerville, Mass.
Lincoln Avenue School, Saugus, Mass.
Mercantile Building for Shikes & Long, Medford, Mass.
Mercantile Building for Progressive Building Co., Medford, Mass.
Residence for George Schrafft, Newton, Mass.
Junior High School, Newton, Mass.
Storehouse for R. L. Palmer Lumber Co., Somerville, Mass.
Stores for Gorfinkle & Barkin, Cambridge, Mass.
Furniture Store for Geo. E. Preble, Cambridge, Mass.
Strengthening Floors in Lever Bros. Factory, Cambridge, Mass.
Court House, Dorchester, Mass.
Factory for Wright-Ziegler Co., Charlestown, Mass.
Factory for Bird & Son, Walpole, Mass.
Mercantile Building, Court and Sudbury Streets, Boston, Mass.
School for City of Boston, East Boston, Mass.
Stores for Meyer Dana, Hyde Park, and Jamaica Plain, Mass.
Nurses' Home for The Faulkner Hospital, West Roxbury, Mass.
The Waterman Block, Hyde Park, Mass.
Store for Conrad & Co., Boston, Mass.
Stores for E. A. Newberry Co., East Boston and Charlestown, Mass.
Meat Storage Building for Chamberlain & Co., Boston, Mass.

The McLeod Warehouse, Providence, R. I.
Mercantile Building for The W. K. Toole Hardware Co., Pawtucket, R. I.
Stadium Realty Co. Theatre, Woonsocket, R. I.
Alterations for Bodell & Co., Providence, R. I.
Alterations for Stores for Narragansett Hotel, Block, Providence, R. I.

Factory for Landers Frary & Clark, New Britain, Conn.
Carbarns, Waterbury, Conn.
The Gaylord Sanatorium, Wallingford, Conn.
Store and Office Building for The Lincoln Land Co., Waterbury, Conn.
Mercantile Building for Hotchkiss Bros. Co., Torrington, Conn.

Administration Building, Villa Rica, Boca Raton, Florida.
Club House, Fishers Island, New York.
Stores for The S. S. Kresge Co., at Alliance, Columbus and Fremont, Ohio; Schenectady and Glens Falls, New York; Omaha, Nebraska; Gary, Indiana; and Butler, Pennsylvania.
Golf Club House, Mountain Lake, Florida.
Bank Building for The Citizens Bank and Trust Co., Southern Pines, N. C.
Building for The Merrimount Realty Co., Cincinnati, Ohio.

Noses for Piers, Gulf Island Development, Central Maine Power Co., Lewiston, Me.
Stores for E. A. Newberry Co., Bangor, Me.
Stores for Green Bros., Sanford, Me.
Store for The Woolworth Co., Bangor, Me.

Bond Block, Manchester, N. H.
Block for T. J. McIntire, Laconia, N. H.
State College Building, Durham, N. H.
Stores for The Woolworth Co., Manchester and Berlin, N. H.

Garage for Surdam & Marshall, Bennington, Vt.
Methodist Church, Rutland, Vt.
Factory for Cary Maple Sugar Co., St. Johnsbury, Vt.

High School, New Bedford, Mass.
Atheneum Building, Westfield, Mass.
Church of Our Lady of Hope, Springfield, Mass.
The Lord Jeffrey Inn, Amherst, Mass.
Sugden Mills, West Chelmsford, Mass.
School for Marist Fathers, Bedford, Mass.
Store for C. F. Wing, Nantucket, Mass.
Stores for The Woolworth Co. at Chelsea, Melrose, Lynn, Lowell, Quincy, Malden, North Adams, Woburn and Boston, Mass.
Trinitarian Congregational Church, Concord, Mass.
Methodist Churches at Fall River and Somerville, Mass.
Apartment Block for The Society of Friends, Lynn, Mass.
Bank Building for Attleboro Savings and Loan Association, Attleboro, Mass.
Police Station, Quincy, Mass.
Dormitories for Smith College, Northampton, Mass.
Quigg Stores, Brockton, Mass.
Buildings for The New England Telephone & Telegraph Co. at Somerville, Wakefield, Salem, New Bedford, Quincy, Mass.
School, Acton, Mass.
Stores for Yerxa, Watertown, Mass.
Building for Society of Eagles, Lynn, Mass.
Sturdy Memorial Hospital, Attleboro, Mass.
Factory for Grover Shoe Co., Stoneham, Mass.
Ribaux Mills, Clinton, Mass.
Dormitory for Wheaton College, Norton, Mass.
Milk Station for H. P. Hood Co., Lawrence, Mass.

Six-story Department Store "On the Square" 14th, 15th and Union Square, New York City, S. Klein, owner.
Elks Club House, Freeport, N. Y.
Bathing Pavilion and Stores, Stillwell Avenue, Coney Island, N. Y.
Y. M. C. A. Building, Port Chester, N. Y.
State Armory, Westfield, N. J.
State Hospital, Kings Park, N. Y.
St. Albans Theatre, St. Albans, N. Y.
Bank of the Manhattan Co., Hollis, N. Y.
Brescia Hall, College of New Rochelle, New Rochelle, N. Y.
Cudahy Packing Co., Norfolk, Va.
Franklin Apartments, Garden City, N. Y.
D. L. & W. R. R. Co., Freight House, Passaic, N. J.
Department Store, John Schoonmaker & Sons, Newburgh, N. Y.
Geilfuss Bakery, Spartanburg, S. C.
School and Auditorium, Valentine Avenue and 182d Street, Bronx, New York City,
R. C. Church of St. Simon Stock.
Trenton Potteries Co., Trenton, N. J.
Fire House, Freeport, N. Y.
Linen Thread Co., Mill Building, Greenwich, N. Y.
New York Telephone Co., Throughout New York State.
Burroughs Library, Bridgeport, Conn.
J. J. Newberry Co. Building, Charleston, W. Va.
Broadmore Country Club, Scarsdale, N. Y.
International Grenfel Association Hospital, St. Johns, Newfoundland.

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